

# NETWORK WORLD

The Newsweekly of User Networking Strategies

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## U.S. factory net proposed by top execs

**By Bob Brown**  
Senior Editor

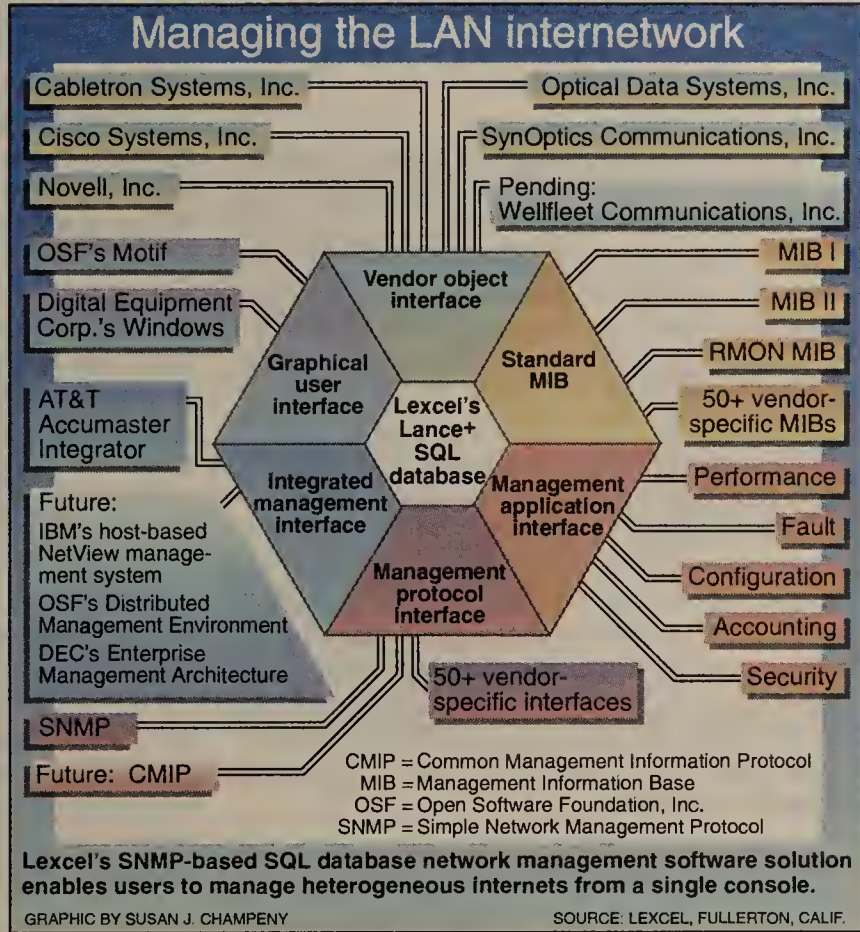
LAKE BUENA VISTA, Fla. — A team of industry executives last week called for the establishment of a nationwide broadband network for linking factories across the U.S. as part of a far-reaching plan to boost U.S. competitiveness in manufacturing.

The Factory America Net is a critical component of the infrastructure needed to ensure that U.S. manufacturers will remain competitive 15 years from now, according to a report issued to managers attending the Agile Manufacturing Conference here.

"The 21st Century Manufacturing Strategy, an Industry-Led View" discusses how the U.S. needs to move beyond mass manufacturing — in which it has already fallen behind — to agile manufacturing, a strategy that stresses resource sharing among suppliers.

The study, which cost about \$500,000 to produce, was developed over a six-month period by a team of industry executives from AT&T, IBM and others, and was coordinated by Lehigh University's Iacocca Institute in Bethlehem, Pa. The report will be submitted to Congress next year by

*(continued on page 6)*



## Lexcel's LAN management vision gaining momentum

**By Maureen Molloy**  
Staff Writer

FULLERTON, Calif. — SynOptics Communications, Inc. last week threw its support behind Lexcel's LAN management package, a product that promises to simplify management of multi-vendor LANs by acting as an umbrella manager for multiple management platforms.

The Lance+ Network Manager is a vendor-neutral network management system based on an SQL database and designed to support standard Simple Network Management Protocol (SNMP) Management Information Bases (MIB) as well as vendor-specific MIB extensions.

The software product runs on a Sun Microsystems, Inc. SPARCstation and is equipped with an

*(continued on page 43)*

## Novell, Unix Labs to blend NetWare, Unix

Integration of products will let customers use new version of Unix in NetWare clients and servers.

**By Caryn Gillooly**  
Senior Editor

NEW YORK — Novell, Inc. and Unix Systems Laboratories, Inc. (USL) last week announced the formation of a company called Univel to develop an easy-to-use version of Unix that will be closely integrated with Novell's NetWare network operating system.

The new software, based on USL's existing Unix System 5 Release 4.1 operating system, will let users of DOS-based NetWare tap the power of Unix's 32-bit architecture without dealing with the usual integration and compatibility issues.

The intention is to enable customers to take the Unix product out of the box, load it up on a personal computer and, without modification, integrate the device into a NetWare local-area network as a server or a client.

This product differs from the existing Unix-based versions of Portable NetWare in that it will not be platform-specific — it will ultimately run on both Intel Corp. and Reduced Instruction Set Computer platforms — and will be much easier to install and use.

Although representatives of the three companies provided

only sketchy details about what the final Unix-based product will look like, they said the tighter integration would be made possible by integrating NetWare services

*(continued on page 6)*



Novell's Ray Noorda (left) and HP's John Young team up on NetWare project. See story, page 6.

## WilTel set to revise frame relay service

**By Bob Wallace**  
Senior Editor

TULSA, Okla. — Bowing to pressure from customers and competitors, WilTel this week is expected to announce major changes for its WilPak frame relay service, including sharp price reductions, new access speeds, and long-term contracts and discount options.

The most significant change is the price reductions, which were necessary to compete with rival Sprint Data Group's frame relay offering, analysts said. WilTel contends that it modified its rates to offer users an "additional incentive" to install frame relay nets.

"These are largely reactive moves," said Christopher Finn, an associate with TeleChoice, Inc., a Montclair, N.J., consultancy. "WilTel looked at [Sprint Data Group's] pricing, listened to its own customers and realized it had to make adjustments."

*(continued on page 42)*

### NETLINE

**LOTUS TIGHTENS NOTES'** ties with Banyan VINES, signs marketing and support pact with LAN maker. Page 2.

**PROMPTUS SET TO UNVEIL** new line of inverse muxes, plans demo at ComNet. Page 2.

**STRATACOM IPX UPGRADE** enables users, carriers to support higher speed access to frame relay networks. Page 4.

**MCDATA EXPANDS** its 3174-compatible LinkMaster controller with new LAN, multiprotocol support. Page 4.

**IBM UNVEILS NEW TCP/IP** for VM that adds support for FDDI, SNMP proxy agent for 3172 controller. Page 4.

**WESTINGHOUSE GOES** global with plans to offer an int'l frame relay service. Page 4.

### FEATURE

## FDDI gains acceptance as backbone option of choice

**By David Terrie**  
Special to Network World

Over the past year, FDDI has increasingly become the backbone of choice.

Indeed, for many organizations, Fiber Distributed Data Interface has arrived in the nick of time because 10M bit/sec Ethernet and 4M/16M bit/sec token-ring backbones have been buckling under the weight of ever-increasing demand.

With a transmission rate of 100M bit/sec, FDDI has ample bandwidth to handle large numbers of interconnected local-area networks, and its ring architecture can form a circumference of up to 100 km. This makes FDDI ideal for use as a backbone.

Those are a few reasons why users are increasingly interested in attaching existing Ethernets and token rings to FDDI concentrators

*(continued on page 27)*

NEWSPAPER

# Sears, Phillips units offer global SNA network service

Firms link internal nets to provide international reach rivaling that of IBM's Information Network.

By Barton Crockett  
Senior Editor

SCHAUMBURG, Ill. — Sears Communications Co. last week said it is teaming with Phillips Communications and Processing Services to extend the reach of its IBM Systems Network Architecture transport service from the U.S. to 29 other countries.

Sears Communications and Phillips have linked their internal networks to create a global SNA net that rivals the size of the IBM Information Network (IIN), currently the only SNA-based, international value-added network (IVAN).

The companies' combined SNA nets have more than 445

front-end processors in about 240 U.S. node sites and an undisclosed number of foreign node sites. The IIN has hundreds of front-end processors in 87 U.S. node sites and in 286 node sites spread among 38 other countries, according to company officials.

Gary Weis, Sears Communications' president, said the international SNA service will be attractive to users that do not want to build private nets but want to avoid routing traffic over IVANs that are not based on SNA.

He said Phillips and Sears Communications will provide better service than IBM and other  
(continued on page 6)

# Lotus Notes upgrade offers enhanced VINES support

Lotus inks marketing agreement with Banyan.

By Timothy O'Brien  
West Coast Bureau Chief

CAMBRIDGE, Mass. — Lotus Development Corp. last week announced a new version of Notes that offers enhanced support for Banyan Systems, Inc. VINES nets and broader access to Notes mail from other applications.

Lotus and Banyan also entered into a new marketing and support agreement designed to leverage the growing interest in Notes among Banyan's large corporate users and its distribution channels.

Through the agreement, customer questions regarding Lotus and Banyan products will be addressed by support staff at both

companies. In addition, the two companies will share customer information. Lotus and Banyan have also agreed to exchange technology and work together to further integrate Notes into the VINES environment.

"Lotus has found out quickly that Banyan's customers are some of the best candidates for Notes," said Ann Palermo, director of office systems research at International Data Corp. in Framingham, Mass. "These users already have a network infrastructure that can exploit Notes."

Among the enhancements in Notes 2.1, Lotus is supporting Banyan's native local- and wide-  
(continued on page 42)

# Promptus set to unwrap new line of inverse muxes

By Bob Brown  
Senior Editor

PORTSMOUTH, R.I. — Promptus Communications, Inc. this week will unveil a line of access devices that will make it easier for users to pool capacity from switched data services for videoconferencing, LAN internetworking and other high-bandwidth applications.

Promptus, based here, plans a first demonstration of the Open Access to Switched Integrated Services (OASIS) products at Communication Networks '92 in Washington, D.C. next month.

The line includes the OASIS

200 Switched Bandwidth Controller and the OASIS 1000 Bandwidth Manager.

The OASIS 200 Switched Bandwidth Controller is an inverse multiplexer that lets users pool bandwidth from multiple 56K and 64K bit/sec links on an as-needed basis. It supports T-1 and Integrated Services Digital Network Primary Rate Interface access to switched and dedicated services and is compatible with AT&T Accunet Switched Digital Services ranging from 56K to 1.536M bit/sec, among other services.  
(continued on page 42)

## Briefs

**NREN becomes a reality.** President Bush last week signed into law Sen. Albert Gore's (D-Tenn.) bill establishing the National Research and Education Network (NREN), a nationwide gigabit net expected to be built by 1996. The bill provides about \$2 billion in funding over five years for computer and communications hardware and software research, including \$400 million for NREN gigabit net technology, which will be deployed in a government-industry partnership.

**FCC moves on resale, holds on tariff.** The Federal Communications Commission last week adopted a new policy encouraging resale of capacity on international private lines. Under the policy, U.S. carriers would have to allow private-line customers to resell that capacity, providing the carrier handling the foreign half of the line permits the practice. Currently, U.S. carriers can bar resale.

Separately, the FCC backtracked on an earlier decision barring changes to existing Tariff 12 deals by allowing a minor change to Honeywell, Inc.'s custom net package. It delayed, until this week, a decision on more substantial changes to other custom nets. At stake are alterations that AT&T has filed for 12 other deals, some involving major price revisions, new services and volume discounts. If the FCC prohibits such actions, users could face problems adapting nets to changing business conditions. It would also make it difficult for new customers to buy into existing deals.

**FDDI over twisted pair proposed.** The Unshielded Twisted Pair Development Forum (UDF) last week made a proposal to ANSI showing the feasibility of Fiber Distributed Data Interface on both shielded and unshielded twisted-pair wire. UDF recommended that the same encoding scheme be used for FDDI over shielded and data-grade unshielded twisted pair but endorsed a different scheme for FDDI over voice-grade unshielded wire. UDF members include AT&T, British Telecommunications PLC, Crescendo Communications, Inc., Fibronics International, Inc., Hewlett-Packard Co. and Ungermann-Bass, Inc.

**Cabletron, IBM ink resale pact.** Cabletron Systems, Inc. and IBM last week announced a

deal through which Cabletron will sell IBM Personal System/2s and RISC System/6000s as platforms for its Remote LANView/Windows and Spectrum net management software. Cabletron now becomes an IBM Authorized Industry Remarketer within the IBM Business Partners Program. IBM will also be able to provide its customers with Cabletron intelligent wiring hubs but only on a bid-specific basis.

**Power to the people.** AT&T last week outlined steps it is taking to prevent a recurrence of the electrical problems in September that cut almost all traffic into and out of lower Manhattan. AT&T is ending an agreement with New York's Consolidated Edison Company of New York, Inc., under which it had agreed to shift to its own generators during peak power periods. The outage occurred when AT&T ran into problems while cutting over to its generators. The carrier said it retains the right to shift to its generators when a power loss occurs. AT&T will also upgrade power generation equipment and alarm systems and implement new procedures to prevent future problems.

**FCC names net reliability chief.** Federal Communications Commission Chairman Alfred Sikes last week named former United Telecommunications, Inc. Chairman Paul Henson to head the newly created Network Reliability Council, which will assess the vulnerability of the public network and develop practices that could be utilized by carriers to prevent network disruptions. Henson said they will soon issue membership invitations.

**DEC, Microsoft work on DECnet.** Under their joint development and marketing partnership, Digital Equipment Corp. and Microsoft Corp. are collaborating on software distribution and licensing for DECnets. Last week at a DEC User Society symposium in Anaheim, Calif., David Thacher, Microsoft senior product manager for Windows NT and LAN Manager, said the firms are cooperating on "standard application program interfaces and technology for software distribution and licensing." Thacher did not elaborate, but analysts believe the technology will make it possible for VAXes to deliver software updates to Windows NT and LAN Manager platforms.

## CONTENTS

### Industry Update

Banyan shifts gears in race to sales goal. 9  
Coalition forms to back object-oriented spec. 9

### Telecommunications

FCC at juncture in history of PCN nets. 11  
MFS adds E-1 support to networks in 12 U.S. cities. 11

### Data Communications

Users air PCN beefs with top lawmakers. 13  
IBM offers info manager for OfficeVision on VM hosts. 13

### Local Networking

Sun bolsters links to SNA, DEC networks. 15  
VINES prevails in survey of LAN costs. 15  
Firm intros E-mail tool for NetWare. 15

### Management Strategies

Landscape changing for net execs of '90s. 17  
Users want better tools for migration to open systems. 17

### Global Networks

Firm expects France to OK VSAT service. 19  
AT&T's Tobias outlines carrier's int'l vision. 19

### Products & Services

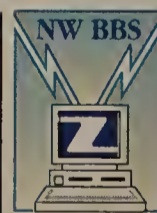
Fracdial outfits mux for videoconferences. 21

### Opinions

Self-sufficiency profits users and vendors. 24  
FCC will proceed slowly but surely with action on PCNs. 25

### Action Center

Networking Marketplace 40  
Networking Careers 41



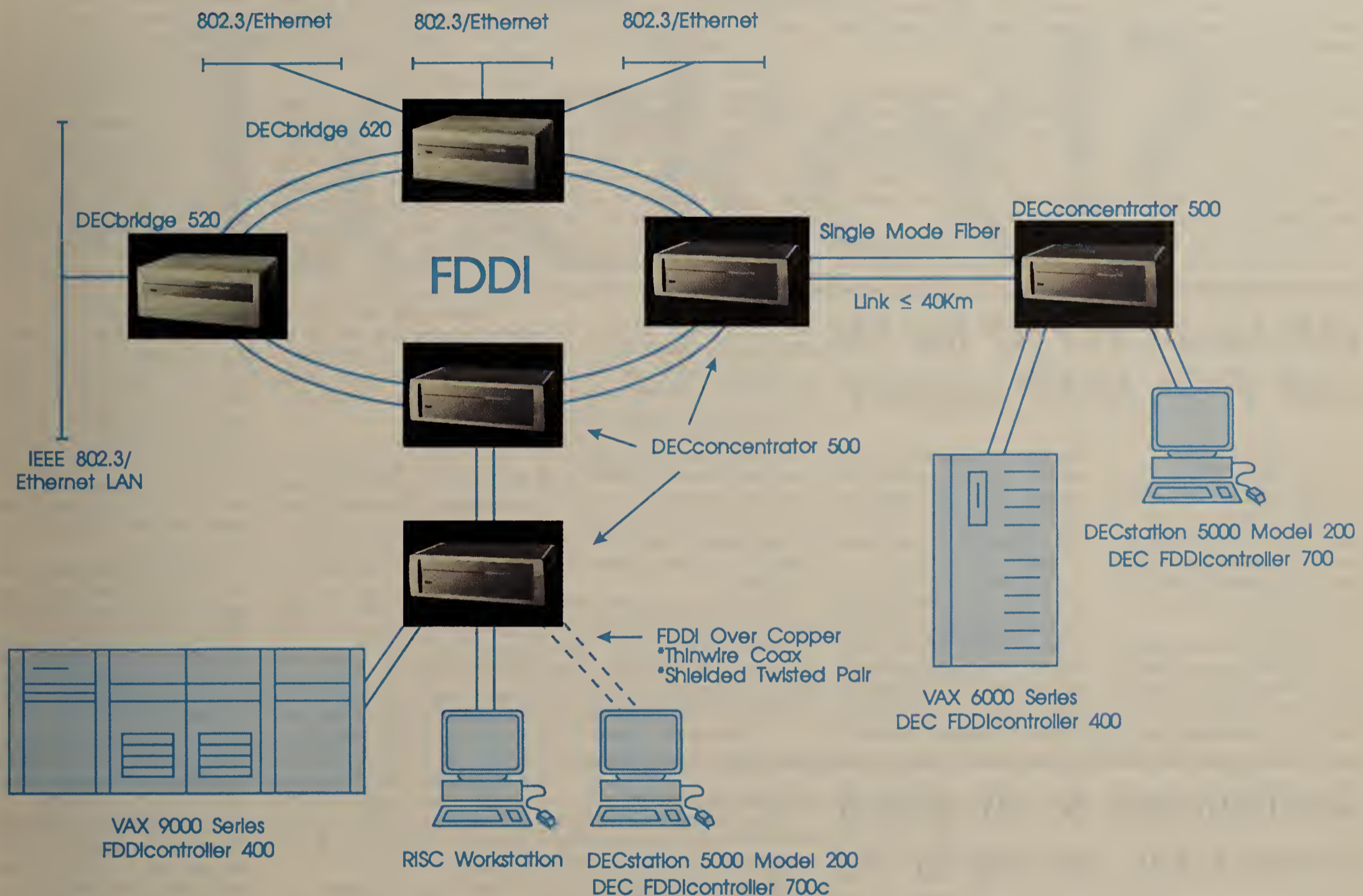
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# StrataCom mux to support higher speed frame relay

Move will help carriers offer faster net access.

By Paul Desmond  
Senior Editor

CAMPBELL, Calif. — StrataCom, Inc. this week will announce a new interface that will enable its IPX multiplexer to support frame relay access at T-1 and E-1 speeds, setting the stage for carriers that use the IPX to upgrade their service offerings.

In addition, the company last week announced that National Telecom Corp. will use the IPX to offer a frame relay service in Canada. National Telecom, a Toronto-based reseller, is the first Ca-

nadian carrier to announce a public frame relay service.

AT&T has already said it will support T-1 access when its IPX-based frame relay service becomes available in the second quarter of 1992.

Last week, CompuServe, Inc. and Witel both confirmed that they will also add T-1 access to their respective IPX-based services. Currently, both support a maximum access port speed of 1.024M bit/sec.

Users with private nets based on the IPX will also be able to take

advantage of the new board, dubbed the FRI-2M, which, in some cases, will double the capacity of users' IPX frame relay net access ports for only an incremental cost increase.

FRI-2M consists of a new interface board and firmware upgrade, said Brian Button, director of product marketing at StrataCom, based here. Like the existing FRI-1M, the new board has four V.35 interface ports and conforms to ANSI and CCITT frame relay standards.

The new board supports the same access port speeds as the FRI-1M, which ranges from 56K to 1.024M bit/sec. In addition, the FRI-2M adds support for three new port speeds: 1.344M, 1.536M and 2.408M bit/sec, Button said.

(continued on page 43)

# IBM boosts TCP/IP for VM with FDDI, SNMP support

By Paul Desmond  
Senior Editor

WHITE PLAINS, N.Y. — IBM last week announced a new release of its VM-based TCP/IP software that includes its first support for FDDI networks and SNMP support for the 3172 Interconnect Controller.

IBM TCP/IP Version 2 Release 2 for VM also features software that lets local or remote IBM RISC System/6000 and Sun Microsystems, Inc. workstations access

data stored on SQL/DS, the chief database product for VM. Additionally, it lets VM mainframes support full-duplex Transmission Control Protocol/Internet Protocol-based LU 0 sessions.

"With our TCP/IP products, we're trying to provide support that better enables our customers to get at existing data and applications," said Jim Holland, product manager for TCP/IP products at IBM. "We're also working to provide the fundamental distrib-

uted processing services for client/server applications."

The new TCP/IP for VM software is due out later this month, the same time as Model 2 of the 3172, which will make it possible to channel-attach a Fiber Distributed Data Interface 100M bit/sec local-area network to a mainframe. The existing 3172 supports channel attachment of Ethernet, token-ring and token-bus LANs.

Also new with Release 2 is support for an Simple Network Management Protocol proxy agent for the 3172. Mary Ellen Minahan, development manager for the TCP/IP for VM product, said (continued on page 43)

# Westinghouse to air global frame relay service in '92

By Bob Wallace  
Senior Editor

PITTSBURGH — Fearing the loss of its X.25 customers to frame relay carriers, Westinghouse Communications last week detailed plans to offer an international frame relay service in the second quarter of 1992.

Westinghouse Communications plans to offer service in most major U.S. cities and points in the U.K. and Belgium with access at 56K and 64K bit/sec, as well as up to T-1 speeds in 64K bit/sec increments.

"We've seen demand for frame relay build at a rapid pace," said Chuck Winschel, director of Westinghouse Communications. "We decided there was enough interest to justify [reworking] our network to deliver frame relay."

Westinghouse will install new packet switches across the U.S. and in Brussels, Belgium, Hamilton, Ontario, and London. The Big Three long-distance providers have announced frame relay services but have not detailed

their international plans. BT Tymnet, Inc., Cable & Wireless PLC, CompuServe, Inc. and Infonet Services Corp. have outlined plans that would make their services more widely available outside the U.S. than Westinghouse's plan.

U.S. users will be able to access the Westinghouse service from most Westinghouse network points of presence, which feed traffic into 17 switching nodes in Atlanta, Baltimore, Chicago, Dallas, San Francisco and New Brunswick, N.J., Winschel said. The carrier will add nodes as demand for the service grows.

The carrier expects to decide this week which vendor's packet switches it will use to support the frame relay service. The three finalists include Sprint Data Group's TP 4900 switch, Northern Telecom, Inc.'s DPN-100 and Telematics International, Inc.'s 5500.

Westinghouse has not yet set pricing for its frame relay service. Winschel said the carrier plans to beta-test its service with custom-

ers before rolling it out.

Westinghouse will likely allow users to exceed the bandwidth they subscribe to under their committed information rate (CIR). Although the CIR guarantees a minimum bandwidth, the carrier may let users send bursts of data above that rate if bandwidth is available, Winschel said.

Westinghouse has no immediate plans to offer a Simple Network Management Protocol-based performance monitoring tool for users. AT&T and Cable & Wireless are working on such tools. "We're not that far along yet," Winschel said.

Westinghouse spent months deciding how to deliver its frame relay service. The company first considered upgrading its 20 Sprint Data Group TP 4000 packet switches to support frame relay but decided that would cost more than buying switches.

Currently, the TP 4000 packet switches are linked with one or more 56K bit/sec lines. Under an enhanced net plan, concentrator devices will pass traffic over 9.6K or 19.2K bit/sec lines to nodal switches, which will be networked using one or more T-1s, Winschel said. The company plans to complete the new net early next year. ■

# McDATA beefs up 3174 device with new features

By Joanne Cummings  
Staff Writer

BROOMFIELD, Colo. — McDATA Corp. last week announced software for its IBM 3174-compatible cluster controller that enhances its ability to support multiple protocols and local-area networks.

Release 2.0 of the operating software for the company's Link-Master 7100 Network Controller enables it to use Ethernet as a transport option in order to communicate with other 7100s and support Digital Equipment Corp.'s Local Area Transport (LAT) and multiple protocols over host channels.

"Whatever the IBM 3174 can do with token ring, we can do with token ring and Ethernet," said Steve Cartwright, group product manager at McDATA.

## Three versions

The 7100, announced last May, comes in three rack-mountable models, all of which come standard with the new software.

The Model 10 is available for local and remote configurations. The local version supports 128 synchronous devices, 34 asynchronous devices and two host channel links, one of which supports IBM's Systems Network Architecture and the other of which can support both SNA and non-SNA protocols. The remote version can be configured with the same number of synchronous and asynchronous devices, as well as one Ethernet or token-ring LAN interface, a V.35 and an RS-232 connection.

The Model 20 supports the same remote configuration as the Model 10, but when used locally, it only has one host channel supporting both SNA and non-SNA protocols and can support just 64 synchronous and 12 asynchronous devices.

The low-end Model 60 comes only in a remote configuration supporting 32 synchronous and three asynchronous devices, one Ethernet or token-ring interface and V.35 and RS-232 connections.

Release 2.0 lets both local and

remote controllers use Ethernet LANs to communicate with other 7100s, enabling users to take advantage of Ethernet's high speed as well as save on cabling costs where Ethernet already exists. The IBM host views the link as if it is a token-ring connection.

McDATA previously supported Ethernet links only on remote 7100s for communications with its 6100 controller product, a higher end controller. With the new software, the 7100 series controllers can also act as DEC LAT terminal servers, enabling controller-attached synchronous and asynchronous terminals to access applications on an Ethernet-attached DEC host.

Traditional IBM controllers require separate asynchronous links to DEC hosts for each session, Cartwright said. But with the 7100's LAT feature, all 128 synchronous devices attached to a Model 10, for example, can use the LAN to interact with DEC hosts. They can also hot-key between DEC and IBM host sessions, he added.

Release 2.0 also makes it possible for controllers channel-attached to IBM hosts to support SNA and non-SNA protocols on the same channel, obviating the need for dedicated controllers for each protocol. The non-SNA protocols supported include Binary Synchronous Communications, Synchronous Data Link Control and X.25. Two protocols can be supported at any time.

The software enables 7100s at remote sites to support a mix of two wide-area net protocols, including BSC, SDLC and X.25. It supports eight physical unit addresses on one to four X.25 links, whereas it had supported just one host via each X.25 link.

The Release 2.0 software, which is available immediately, is provided at no extra charge with the 7100. Pricing for the 7100 depends on configuration and ranges from \$5,635 for a 16-port, single remote host configuration to \$29,935 for a 128-port, single-channel connection. Current customers can upgrade to the new software for free. ■

**Corrections:** The story "NET embraces DME as base for net mgmt. applications" (NW, Nov. 25) inaccurately reported capabilities of Newbridge Networks, Inc.'s T-1 multiplexers. Newbridge's virtual network partitioning allows as many as 128 virtual nets to share a pool of spare bandwidth. Users are not required to manually detail a primary and secondary route for every virtual net circuit, although that is an option. Users

need only identify two end points for each circuit.

The story "Cable & Wireless to air int'l frame relay" (NW, Dec. 9) incorrectly stated the number of carriers that will support the Cable & Wireless PLC service. The company is working with several of its 36 affiliate carriers to support the service but declined to say how many are involved in the project.

# LAN Locked?

*AT&T's New BNS-1000 Fast Packet Switch  
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Network Systems

# HP and Novell to build RISC NetWare version

MOUNTAIN VIEW, Calif. — As expected, Hewlett-Packard Co. and Novell, Inc. last week said they plan to build a version of NetWare for HP's Precision Architecture RISC computers.

The firms also plan to collaborate on integrating printing, messaging and directory services between HP and NetWare environments, and will strive to create interoperability between their respective network and local-area network management tools.

Both companies emphasized that the new NetWare version will be the first port of Novell's native NetWare to a Reduced Instruction Set Computer architecture. Native NetWare is the version originally developed and optimized for DOS.

The new NetWare version will not run on top of Unix, but instead will be a highly optimized version of NetWare that is positioned as the operating system for HP's line of processors, which range from work group systems to high-performance servers.

In addition, this new version will support the functions and features of native NetWare. Also, it will enable users to migrate applications from personal computer-based servers running native NetWare to the higher performance HP RISC servers.

"This is an extremely powerful alliance," said John Girard, manager of West Coast operations for New Science Associates, Inc. "Through agreements like this one, [NetWare] has a straight shot at being a major operating system in many environments."

Although the new version isn't expected until 1993, Dar-

rell Miller, Novell's executive vice-president, said Novell is already developing a hardware-independent version of NetWare.

"As a result of this agreement, we will be able to take that development work and gravitate it over to the RISC environment," he said.

HP and Novell have worked together in the past since HP has been a licensee of Portable NetWare — now called NetWare for Unix.

One of those projects is the inclusion of elements from HP's NewWave graphical desktop manager into NetWare for simplifying LAN use and administration.

The two companies are now working to determine the best way to deliver a collection of tasks based on NetWare utilities that will automate network administration. The product is expected to be available in 1992.

In the area of printing, HP said it will expand beyond current efforts to simply provide network printer interface cards and work with Novell to offer better integrated and higher performance network printing software for NetWare.

The companies are also investigating the integration of Novell's Message Handling Service environment with HP electronic mail systems built around Open Systems Interconnection X.400 messaging and X.500 directory protocols.

In the future, the companies said they will explore ways in which to provide interoperability between HP OpenView network management software and Novell net management products.

— Tim O'Brien

## Companies to blend offerings

*continued from page 1*

into Unix. According to Kanwal Rekhi, executive vice-president and general manager of Novell's Interoperability Systems Group, based in San Jose, Calif., some of the services to be included will focus on administration and network management.

Bill Bluestein, senior analyst for Forrester Research, Inc., a consultancy based in Cambridge, Mass., speculated that at least one of these services will likely be Novell's Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX) transport protocol.

"This [new version of Unix] will be NetWare-ready out of the box," Rekhi said. It will not require third-party connectivity products or additional configuration to enable Unix-based machines to fully participate in a NetWare LAN, he added.

Joel Appelbaum, president and chief executive officer of the newly formed company, which is based in San Jose, said the product will be used in both client and server devices.

The new version of the operating system, which will be available by July, will be binary-compatible with existing versions of Unix, meaning current Unix applications should be compatible with the new version.

### The deciding factor

Analysts said the new Unix product may be the deciding factor that will spur the use of Unix in commercial environments and will prove to be a boon for users.

NetWare customers will no longer have to shy away from using the more powerful Unix operating system simply because it is less user-friendly or because it does not work well with NetWare.

"With this [announcement], we will bring the power of Unix [down] to the users, [instead of asking] the users to come up to the power of Unix" and forcing

them to deal with a more difficult operating system, Appelbaum said.

Bluestein agreed. "Unix has never been ready for prime time. It's always been hard to install and hard to use." The new release, he added, will solve those problems.

Users will be able to get this version of Unix at the same place they get NetWare — the new version will be sold by NetWare authorized resellers. "Users will have an easy-to-use, easy-to-install Unix they can get through the channel where they buy all their other network components," Rekhi said.

Analysts agreed that the creation of Univel will have a positive impact on the entire Unix market because of Novell's stature and will legitimize Unix for business environments.

"This will take away the barrier for Unix to commercial desktop users," said Kate Fessenden, senior research analyst at the META Group, a consulting firm based in Westport, Conn. "[Business] users have always been able to buy DOS off the shelf — that's what an operating system is to them. Now Unix will come that way, too, and it will be much easier to deal with."

### Users pleased

Despite the lack of details, users seemed pleased with the prospect of better NetWare/Unix integration.

"This sounds terrific to me," said Jim Krantz, president of Krantz & Associates, a systems integration company based here that has both NetWare and Unix servers.

"Anything that will be able to provide seamless integration between NetWare and Unix will be a benefit," he said.

Steve Greene, academic computer network administrator at the Moorhouse School of Medicine in Atlanta, agreed. "The closer together Novell and Unix get, the easier life will be for me," he said. □

## Net proposed by top execs

*continued from page 1*

the secretary of defense.

"We've suggested that a new infrastructure is needed to enable competition in the year 2006," said Roger Nagel, operations director at the Iacocca Institute and a contributor to the report.

The report identifies the critical components needed to boost U.S. manufacturing competitiveness, including adherence to international computer and network standards and a global broadband public network, a sub-network of which would be the Factory America Net. Distributed databases and groupware were also discussed as key applications the network would have to support.

"The network will be the driver for the next industrial revolution," said Kenneth Preiss, director of the Iacocca Institute's vendor integration center.

The Factory America Net is described in the report as "a value-added network that will tie together a large percentage of American manufacturers and suppliers into a cohesive on-line community" similar to the Internet, which services universities and research organizations.

By linking factories across the country with a single net, the Factory America Net would enable the establishment of "virtual companies," Nagel said.

Virtual companies would involve the creation of ad hoc teams of manufacturers to work on specific projects that could be assembled and disbanded quickly, he said. This would enable manufacturers to be more nimble and responsive to changing market needs.

The way Nagel envisions it, a company could send a message over the network requesting certain supplies to develop a product. Manufacturers on the network could then bid to work on the project.

The network would also foster concurrent engineering, which could involve linking various departments, such as marketing and product design, within a company or among multiple firms.

Among the network facilities being considered for linking manufacturers is the Enterprise Integration Network, a router-based network recently proposed by a consortium of leading companies ("Groups mull plan for U.S. business net," NW, Nov. 18).

The bottom line for U.S. manufacturers is that the new infrastructure must be put in place soon, Nagel said.

"Our perception is that other countries are planning similar advances," he said. "The good news is that everybody has to build a new infrastructure, so we are not as far behind as we would be if mass production were still going to be the focus in 2006." □

## Units offer global service

*continued from page 2*

IVANs because both companies are users. But analysts said the two could find it tough to compete against established IVANs with deep pockets.

Sears Communications, based here, is a division of Sears, Roebuck and Co., which claims to be one of IBM's five largest customers. Phillips is the data processing arm of the Dutch electronics firm Phillips, NV.

Officials from Sears Communications said the company teamed with Phillips to quickly build an international presence for SNA services it began providing in the U.S. in 1986.

About 20 of Sears Communi-

cations' more than 1,000 customers have asked for international SNA transport services, said Dee Manire, the vendor's vice-president of sales and marketing.

But Sears Communications' ability to meet these service requests has been constrained by its limited international presence. Sears Communications has one node site in London, one in Puerto Rico and about 15 node sites in Canada.

Phillips operates an SNA network with approximately 125 front-end processors in about 30 countries, including the U.S., said Robert Meijer, Phillips' international account manager in Eindhoven, Netherlands.

The companies will provide users with managed network ser-

vices that route traffic between two or more locations. The firms have linked their IBM NetView management systems so each can monitor the performance of customers' SNA service worldwide. Phillips and Sears Communications have also developed common service provisioning and fault management.

Manire said Phillips and Sears Communications will initially only offer SNA transport services at speeds up to 56K bit/sec in the U.S. and 64K bit/sec abroad. After 1992, the companies are considering offering electronic data interchange, frame relay and Transmission Control Protocol/Internet Protocol services. But officials from both companies declined to release any pricing.

The only international beta

customer of the Phillips-Sears Communications project is Harper Group, Inc., a \$500 million shipping firm in San Francisco. Steven Olson, Harper's chief information officer, said the company has received superb domestic SNA service from Sears Communications for more than two years.

In the test, Harper Group sends logistics data from an IBM Application System/400 in Frankfurt, Germany, to a front-end processor on the Phillips network. Data then flows over SNA nets owned by Phillips and Sears Communications to a Harper mainframe in San Francisco that is linked to a local Sears Communications front-end processor via multiple 56K bit/sec private lines. □

# IBM exec shares plans for APPN, multiprotocol router

**Q&A** IBM's Systems Network Architecture is undergoing changes that could redefine the way users employ SNA nets in the future.

*Network World* Senior Editor Paul Desmond recently discussed the transformation of SNA with Rick McGee, manager of communication systems architecture in IBM's Networking Systems group. Last week, McGee talked about IBM's short-term Advanced Peer-to-Peer Networking (APPN) strategy. In the second half of this two-part interview, McGee talks about the role of IBM's heralded multiprotocol router and the migration to a high-speed, multiprotocol, multimedia SNA.

**IBM is due to come out with a multiprotocol router soon. How will that be positioned compared to the remote front end, especially if they can both be configured as APPN network nodes?**

They're complementary. The router is going to be best suited for interconnected LAN environments that have multiprotocol needs. The router can consolidate a lot of traffic.

Remote controllers [will] continue to be important because of the value-added functions they have, like network management support for SNA devices and the LU 2 support they provide today. They are an important bridge for LU 2 until we get full LU 2-over-APPN routing.

**IBM has said its router will encapsulate Synchronous Data Link Control protocol data, but are there any plans to support a full PU 4 implementation?**

It's the most expedient thing to do — to encapsulate SNA/SDLC traffic over the router network. Some router vendors have had problems with that. It's kind of tricky, especially with timing. Our router people have a very good solution to that.

A follow-up step is to do more native APPN routing in the multiprotocol router products. APPN is the way to go, not PU 4.

## Why?

One of the big reasons for doing APPN is to make the network easier and more dynamic to define so there are fewer SYSGENS involved. If you start proliferating PU 4 technology on the multiprotocol routers, you're making the problem worse.

Also, it would be very expensive. PU 4 technology has been incrementally built up over the past 12 years or so. It's a robust, reliable, high-function, extremely good error-recovery type of protocol. It would be very difficult to

put a good robust PU 4 implementation on a router product. There are a lot of complex algorithms.

**Will APPN network node**

**support be on the router from Day 1?**

The intent is to announce everything that's going to be available in '92. Not every protocol announced will be shipped on Day 1, but by the end of the year, they'll all be there.

**Will APPN be in the first release?**

I don't think so.

**You've talked in the past about a 'new SNA' that will support gigabit speeds, multimedia and multiple protocols. Is that going to be based on the PARIS fast packet switch the IBM research group has been working on?**

We're drawing a lot from the

PARIS work. They worked out a lot of problems in terms of the types of protocols, hardware, control flows and algorithms that needed to be in place to support a high-speed packet environment.

Today, all vendors have their own proprietary way of doing that. Frame relay is an interface and a way of routing packets, but

(continued on page 14)

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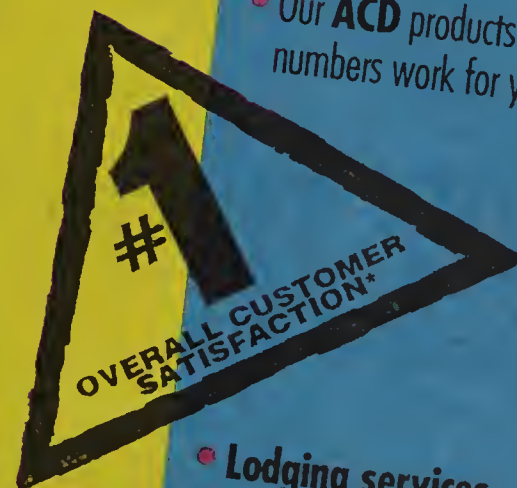
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\*DATAQUEST INC. (a Dun and Bradstreet Company), Score Report: Customer Satisfaction — PBX Systems, June 1, 1991

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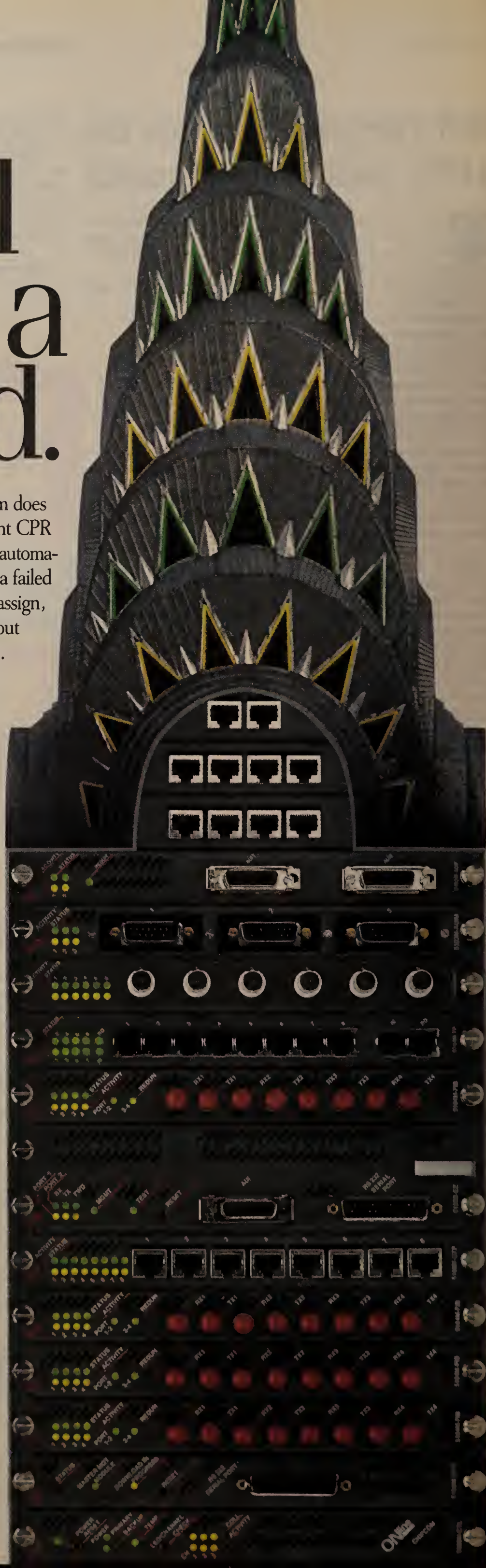
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# INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

## Worth Noting

“Given [US Sprint’s] total revenues, low profit margins and low share in the digital private-line market, it is the long-distance carrier that stands to benefit most from a frame relay boom.”

Michael Elling  
Vice-president  
Oppenheimer & Co.  
New York

## People & Positions

Rick Roberts last week was named to the new position of vice-president of quality and customer support at **Fibermux Corp.**, manufacturer of the Crossbow intelligent wiring hub.

Roberts will be responsible for analyzing and improving quality processes at the Chatsworth, Calif., network equipment maker.

He will also implement customer support programs, as well as oversee maintenance and repair services and contracts.

Previously, Roberts was vice-president of quality assurance at Wangtek, Inc., a Simi Valley, Calif., maker of computer tape drives.

**Concord Communications, Inc.**, a Marlborough, Mass., manufacturer of Open Systems Interconnection-based data communications products, last week named **James Hertenstein** as its director of marketing.

Hertenstein will be responsible for worldwide marketing and strategic product planning for Concord’s Trakker network monitor.

In addition, he will oversee the company’s business development and marketing communications programs as well as sales.

Previously, Hertenstein was president of Market Dynamics, a Sudbury, Mass., consulting firm he founded. □

## DBMS coalition forms to back object-oriented spec

Would unite databases in CAD/CAM networks.

By Ellen Messmer  
Washington Correspondent

MENLO PARK, Calif. — Five start-up database vendors last week said they have formed a coalition to back a common specification for object-oriented databases typically used in network management applications and computer-aided design and manufacturing nets.

The implementation of standards would allow users to access data across the multivendor object database products frequently used in the manufacturing and telecommunications environments today, vendors said.

The five-member coalition, informally known as the Object Database Management Group, intends to submit its database definition and access specification to the Object Management Group (OMG) as well as other industry and standards organizations in the hope that an industrywide consensus on database definition and manipulation can be reached.

Drew Wade, vice-president of Objectivity, Inc., said the database group, which also includes Object Design, Inc., ONTOS, Inc., Servio Corp. and Versant Object Technology Corp., represents a team that will compete in OMG’s selection of data management interfaces next year.

In the first quarter of 1992,

OMG, a Framingham, Mass.-based industry consortium, will issue a request for information to its members as the first step in a long-term effort to define common interfaces for a wide range of so-called object services.

OMG President Chris Stone said the targeted object services will include data repositories, object linking and embedding, concurrency control and database management.

Stone said other groups will also be competing in the OMG runoff next year but praised the five start-up vendors for putting aside their separate interests to focus on interoperability.

“We think standardized databases will be good for the industry as well as for us,” Wade said, adding that the five database vendors also plan to submit their ideas to other forums, such as the Computer-Aided Design Framework Initiative, Product Data Exchange Specification, Inc. and ANSI.

“We want all the organizations to agree on how to access databases,” Wade said.

Mary Loomis, vice-president of technology at Versant, said the Object Database Management Group will focus on solving the problems of portability and source-code compatibility where language interfaces are different for object databases. □

“In the past year, we made the difficult transition out of hardware and put in place a strategy to use alliances to leverage our strength in network services.”

David Mahoney  
Chairman and CEO  
Banyan Systems, Inc.



## Banyan shifts gears in race to sales goal

Firm to focus on making VINES services available on other LANs; partners to offer NOS extensions.

By Timothy O’Brien  
West Coast Bureau Chief

WESTBOROUGH, Mass. — With 1992 just weeks away, Banyan Systems, Inc. executives are putting together a strategy to significantly grow revenue by making key network services in its VINES software available on other vendor platforms.

Banyan’s long-term goal is to grow from a \$100 million company to more than triple that size within a few years, and it hopes to do so by extending VINES services to other popular local-area network operating environments.

The LAN software provider has already embarked on its growth strategy, gracefully exiting the LAN hardware business to focus on higher margin software offerings and striking alliances with other vendors to enhance VINES functionality. These actions have allowed Banyan personnel to focus on the development of LAN operating system services.

“In the past year, we made the difficult transition out of the hardware business and, at the same time, put in place a strategy to use alliances to leverage our strength in network services,” said David Mahoney, Banyan chairman and chief executive officer.

In addition, Banyan is searching for a high-level executive to take over day-to-day operations from Mahoney and manage the company’s anticipated growth. Such a move would free Mahoney to focus on long-term strategy and refine the firm’s vision for its products.

Analysts said Banyan’s evolving strategy calls for the company to leverage its successful VINES network services, such as its StreetTalk directory or messag-

ing, and make them available for use in Novell, Inc. NetWare or Unix networks. Eventually, analysts added, Banyan will provide its services for Microsoft Corp.’s Windows NT operating system.

In addition, Banyan plans to increase technology and distribution alliances both domestically and internationally.

In pinpointing the critical next step for Banyan, analysts insisted that Banyan must move aggressively to offer its wide-area networking and directory services

“Banyan has to make its network services seamlessly integrate with NetWare in order to survive,” Girard said.

▲▲▲

for NetWare LANs, despite the short-term conflict with its own VINES efforts.

“Banyan has to make its network services seamlessly integrate with NetWare in order to survive,” said John Girard, manager of West Coast operations at New Science Associates, Inc. in Mountain View, Calif. “Not only is this an important step, but Banyan needs to do it fast.”

Analysts and other industry watchers said these moves are critical for Banyan’s growth since repositioning its highly regarded networking technology into multiplatform network services is the only way for the firm to avoid (continued on page 42)

## INDUSTRY BRIEFS

**Novell reports record financials.** Novell, Inc. last week said revenue for its fiscal year ended Oct. 26 shot up 29% from fiscal 1990, climbing to \$640.1 million from \$497.5 million. Novell posted net income of \$162.5 million, up 72% from the \$94.3 million in 1990. Fourth-quarter net revenues reached \$187.2 million, up 33% from the same period last year. Fourth-quarter net income was \$50.6 million, up from \$32.6 million in the corresponding period in 1990.

Novell attributed the most successful year in its history to strong sales of its NetWare 3.X operating system software as well as its international sales growth, particularly in Japan, where its first Kanji language version of NetWare began shipping in July.

**SynOptics gains Canadian certification.** Telecom Canada last week said it has certified SynOptics Communications, Inc. as the first intelligent hub vendor to supply products to the carrier and its users as part of an equipment certification program.

Telecom Canada’s member companies include AGT, Ltd., Bell Canada, British Columbia Telephone Co. and Telesat Canada, among others. Those companies will purchase SynOptics’ internetworking equipment as well as recommend it to their customers. □

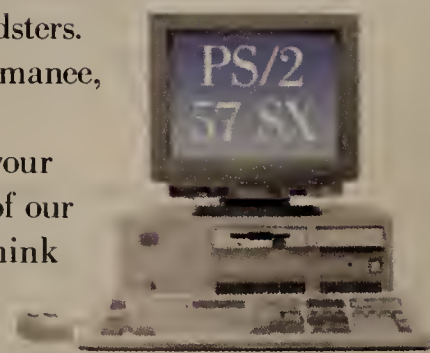
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# TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

## Worth Noting

**A**T&T last week said it expects its worldwide network will handle a record 94 million calls on Christmas Day, about a 10% increase over last year. The carrier said Christmas is its busiest calling holiday, with Mother's Day a close second.

## Carrier Watch

**A**T&T is offering new Software-Defined Network users a free month of service in return for customers that commit to multiyear contracts.

Companies must use one of the carrier's Expanded Volume Discount Plan (EVP) options, use T-1 or voice-grade private lines to access the service and order it by Jan. 1. Service installation must be requested by July 1.

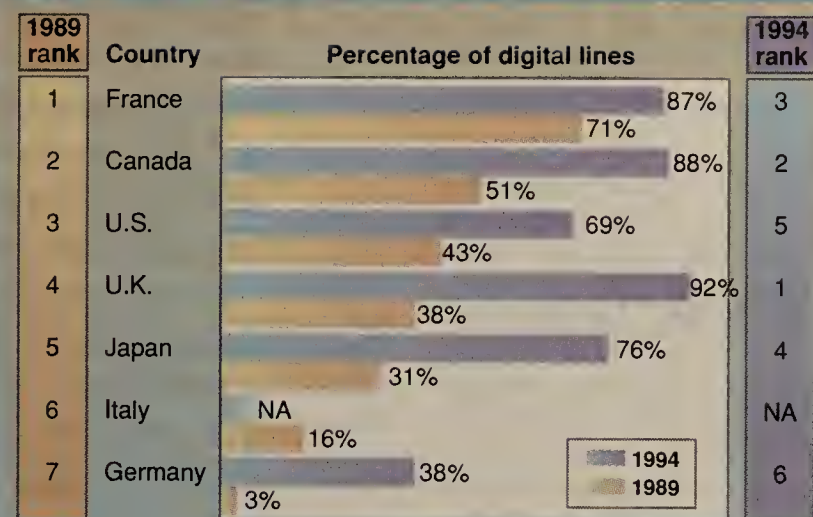
Customers must use the service in two locations served by dedicated access lines that have the equivalent capacity of two T-1 links.

Users that sign up for EVP II or EVP IIA and bill two million minutes a year for three of the agreement's four years receive a maximum credit of \$20,000.

Those who commit to EVP IIB — which requires three million minutes a year for three of the four years — receive up to \$22,500 while those that sign up for IIC, which requires five million minutes a year for any three of the four years, can receive \$30,000.

Users that sign up for EVP IV, which requires 200 million minutes a year for any three of the four years, can receive a maximum \$100,000 credit, while those that commit to EVP V — 10 million minutes a year for three of the four years — can receive \$40,000. Those that sign up for EVP VI, which requires 15 million minutes a year for any four of five years, can receive as much as \$60,000. ■

## Comparison of worldwide plans to install digital local loops



Percentages have been rounded.

NA = Not available

SOURCE: NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION, WASHINGTON, D.C.

## MFS adds E-1 support to networks in 12 U.S. cities

Lets customers use a single trunk for E-1 access.

By Bob Wallace  
Senior Editor

**OAKBROOK TERRACE, Ill.** — Metropolitan Fiber Systems, Inc. (MFS) recently began offering 2.048M bit/sec E-1 service in 12 U.S. cities to accommodate long-haul links supporting the international equivalent of domestic T-1 service.

To date, companies with E-1 international links have been forced to use two local exchange carrier T-1 lines in order to access the high-capacity services. But companies can now use a single MetroFiber E-1 trunk to access interexchange carriers offering similar services to international gateway switches.

E-1 is a CCITT standard used primarily overseas that delineates how a single line can be configured to support 30 64K bit/sec channels, as opposed to the domestic T-1 standard that supports only 24. E-1 links are widely available in European countries.

"We're enabling users to deliver over 2M bits of traffic to gateway switches without needing to buy a second T-1," said Rick Kozak, MFS's senior vice-president of network services. "Users stand to save a good deal of money."

Customers need either a T-1 multiplexer with an E-1 interface or an E-1 compliant channel service unit to use the MetroFiber E-1 service, which is available on the carrier's all-fiber metropolitan-area networks in Baltimore, Boston, Chicago, Dallas, Houston, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh, San Francisco and Wash-

ington, D.C.

Interexchange carriers typically locate international gateway switches in a subset of those cities, including Chicago, Dallas, New York and San Francisco, Kozak said.

In cities that do not have international gateway switches, MFS can deliver an E-1 data stream to an interexchange carrier's mux capable of building multiple E-1s into a 45M bit/sec T-3 trunk.

Although few carriers offer E-1 services, this multiplexing capability enables them to accommodate the E-1 needs of users.

### Money broker tests service

MFS announced that Tullett and Tokyo Forex, a New York-based money broker, has been beta-testing MetroFiber E-1 service since March to support transmission of voice and data traffic between its New York and London offices.

"Most international carriers offer E-1 service, but we also wanted delivery of it locally in the U.S.," said Ted Castator, a Tullett and Tokyo Forex vice-president. "Now we can meet the standard of our international offices by using MFS's E-1 service to access our long-haul carriers."

MFS charges \$1,600 a month under a one-year contract for the service. The carrier also offers three- and five-year contracts. The service carries a onetime \$2,000 installation fee for the first E-1 link and \$1,500 for each additional E-1 circuit.

The company offers discounts ranging from 3% to 10% for users that sign longer term contracts or add circuits. ■

## FCC at juncture in history of PCN nets

Faces tough decisions over new breed of wireless services that could change the face of the industry.

By Anita Taff  
Washington Bureau Chief

**WASHINGTON, D.C.** — In gearing up for the advent of new wireless personal communications network (PCN) services, the FCC is undertaking one of the most important decisions it will ever make, according to industry experts.

At a recent special hearing held by the Federal Communications Commission, experts told the agency that PCNs have the ability to completely transform the current state of communications. They also said the technology will, at long last, permit meaningful competition in the local loop, give users more control over the telecommunications network and trigger a host of new services.

Because expectations are so high, the FCC finds itself in the center of a high-stakes game. Consultants, carriers and research firms predict an exploding market for PCN wireless voice, data and video services during the next 10 years. They say millions of users will buy services worth billions of dollars.

The FCC must ensure that services are affordable, widely available and as competitive as possible.

**E**ven though there is currently no PCN service available, witnesses at the hearing said they expect PCN to become a huge market.

ble. They must also find radio spectrum for the services, a process that will likely displace some existing microwave users.

Additionally, the FCC must solve a host of technical and regulatory problems. For example, because there is only a limited amount of spectrum available, the agency must determine who should get the PCN licenses, how large an area the licenses should cover and how many competitors it will allow in one market.

PCN is a wireless technology that permits voice, data and video

transmission via small hand-held devices. The technology is independent of wireline telephone networks that can support intelligent network features such as call blocking, call forwarding and call screening.

Even though PCN services are not currently available and there is little equipment and no commercial users, witnesses at the hearing said they expect PCN to become a huge market.

**R**evenue for basic PCN services will range between \$30 billion and \$40 billion — half of the local telephone companies' revenues.

John DeFeo, president of US West Spectrum Enterprises, a subsidiary of US West, Inc., said his firm speculates that 27% of the U.S. population will use PCN services by the year 2005. In comparison, about 23% of the population uses a combination of cellular and paging services now.

Clifford Bean, director of the mobile telecommunications consulting practice at Cambridge, Mass.-based Arthur D. Little, Inc., offered the FCC even more optimistic figures. In the first three to five years after PCN services are available, Bean said he expects the services to attract 14 million subscribers. Today, only about six million customers buy cellular services, which have risen sharply in popularity in recent years.

After 10 years, Bean said the PCN market will explode to 60 million subscribers. Revenue for basic PCN services will range between \$30 billion and \$40 billion — half of the local telephone companies' current revenues.

John Major, senior vice-president of Motorola, Inc.'s worldwide systems group, said the PCN market will grow dramatically on the international front. He projects 150 million PCN subscribers worldwide by the year 2000. Currently, there are 34 million cellular and paging customers worldwide. ■

## Tests prove UDS modems best against bad lines

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# DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

## Worth Noting

**B**BN Communications Corp. of Cambridge, Mass., last week announced that the Systems Network Architecture net it designed and built for Japan Air Lines Company, Ltd. (JAL) has achieved 99.99% availability during the past year. The network links JAL's Tokyo data center with 22 major sites and supports more than 10,000 terminals in travel agencies throughout Japan.

## IBM offers info manager for OfficeVision on VM hosts

Windows pack provides access to host services.

By Paul Desmond  
Senior Editor

WHITE PLAINS, N.Y. — IBM recently announced a new version of its Current personal computer-based personal information manager (PIM) software that works with the VM version of its OfficeVision product.

The new Current-OfficeVision (OV)/VM Workgroup Program is a Microsoft Corp. Windows-based PIM that provides a graphical user interface (GUI) to electronic mail, calendar and other services on the host-based OfficeVision/VM.

IBM also announced a product that provides a Windows-based GUI to OfficeVision/2 LAN, the OS/2-based version of OfficeVision. In addition, the company unveiled IBM Presentation Manager/2, which provides an OS/2-based GUI to OfficeVision/MVS.

Current, the Windows-based PIM, provides services such as a calendar, database, phone directory, word processing and phone log, according to Mike Early, manager of office market planning at IBM.

Current allows users to forge links between files, messages, notes and documents, such as a phone message that pertains to a

meeting scheduled on the calendar. In that fashion, users can easily retrieve all information relevant to a given topic, he said.

With Current OV/VM Workgroup, users can tap into OfficeVision/VM on the host to download E-mail, calendar information and other data, then work on the data locally without a host connection.

The data can also be added to existing Current data, allowing the user to employ all Current features. That enables the new software to identify scheduling discrepancies between Current and OfficeVision calendars, for example.

Additionally, Current users can establish a host connection to send E-mail, notes and other documents to OfficeVision users after creating the documents on the PC.

The product consists of both host and PC-based software that supports LU 2 sessions with attached PCs, Early said. It is an enhancement to an existing product that supports a link between Current and IBM's Professional Office System (PROFS).

Current OV/VM Workgroup is available now. Similar to its pre-

(continued on page 14)

## Firm offers pack to ease system access across nets

By Joanne Cummings  
Staff Writer

ROCKY HILL, Conn. — Pyramid Development Corp. recently announced a new line of software that enables users of its PC/DACS security system to use a single password to access multiple computers across different networks.

The company's Single Sign-On (SSO) products help manage user identifications and passwords across networks. In this way, users who have logged on to a personal computer once can access a local-area network and a mainframe without having to memorize and input separate IDs and passwords.

"In many multiplatform computing environments, a single user can enter up to a dozen different ID and password combinations during the course of a work day," said John Worthen, president and chief executive officer of Pyramid. "Our SSO products eliminate or drastically reduce

this problem."

The SSO product family currently consists of two software facilities and a set of software developer's kits designed for OS/2, MS-DOS and Microsoft Corp. Windows workstations.

The two facilities use the security features of PC/DACS to pass ID and password maintenance data across different computer environments.

For example, one facility lets users who have logged on to a PC access a file server in LANs running popular operating systems, including Banyan Systems, Inc.'s VINES and Microsoft's LAN Manager, without having to enter a new ID and password.

When the server application prompts the user for a password and ID, the facility searches PC/DACS' security database and inputs the correct information automatically.

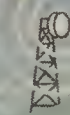
The second facility is 3270

(continued on page 14)

## Frequency battle heats up

Private microwave users are fighting to keep the 2-GHz frequency, which the FCC may reallocate for personal communications networks. Among the issues are:

- ☐ Whether it is fair for a new technology to again push microwave users out of a widely used band. (They were moved in the 1980s from the 12-GHz band to make way for direct broadcast satellite.)
- ☐ Limited availability or lack of bandwidth in other frequency bands.
- ☐ Concern over who would pay for a reallocation and whether either side can afford it.
- ☐ Concern that reallocation would disrupt services currently delivered over microwave networks.
- ☐ Time frame within which the move would be completed.
- ☐ Lack of enhancements and support from microwave equipment vendors for existing microwave wares, which would continue to be used while the new frequency is phased in. Vendors would likely focus development efforts on products that work in the new frequency.



GRAPHIC BY SUSAN J. CHAMPENY



## Users air PCN beefs with top lawmakers

Microwave users want to lobby legislators to block FCC plan to reallocate spectrum for new PCNs.

By Bob Wallace  
Senior Editor

WASHINGTON, D.C. — Fearful that their pleas for help have fallen on deaf ears at the FCC, users and trade associations are pressing politicians here to draft legislation that would block the agency from reallocating radio spectrum to personal communications service operators.

Private microwave users, led by state and local governments as well as public safety groups such as law enforcement and fire departments, are mounting strong lobbying efforts to thwart a Federal Communications Commission plan to evict microwave users from their current radio frequencies.

The FCC has said it will take away at least some portion of the radio spectrum in the heavily used 2-GHz band from private microwave users, but the agency has not yet finalized its bandwidth reallocation plan.

However, organizations that operate microwave networks in the 2-GHz band would rather fight than move.

Members of the National Association of State Telecommunications Directors (NASTD) have met with FCC Chairman Alfred Sikes and several commissioners in an effort to apprise the agency of the impact a frequency change would have on their statewide microwave networks.

"We feel that what we have told the FCC has fallen on deaf ears and that the decision to

move private microwave users out of the 2-GHz band may already have been made," said Paul Warnecke, director of the commonwealth of Kentucky's telecommunications division.

Kentucky operates a statewide private microwave net comprising a 6-GHz backbone serving large sites with 2-GHz links to smaller locations. Warnecke estimates that relocating to another frequency would cost the state between \$5 million and \$15 million.

Warnecke said he has since made every Kentucky congressman aware of the potential effect of an FCC decision to reallocate spectrum from the state's private microwave users to personal communications network (PCN) operators.

"We may indeed mount a legislative effort to stop [the move]," Warnecke said. "When your back's to the wall, you do what you have to do."

NASTD, along with the Association of Public Safety Communications Officers and the International Bridge, Tunnel and Turnpike Association, recently joined forces to pool resources for lobbying efforts on Capitol Hill and at the FCC against a frequency change.

The Arkansas State Police, which recently cut over a 185-hop statewide private microwave network, has won the support of U.S. Sen. Dale Bumpers (D-Ark.), who in a letter to Sikes expressed

(continued on page 14)

## Data Packets

**General DataComm, Inc. (GDC)** this week will announce the opening of a new European Technical Operations and Assistance Center (TOAC) in Wokingham, England. The center will be used to provide diagnostic services for GDC users in Africa, Europe and the Middle East. It is GDC's second TOAC, joining the company's facility at its Middlebury, Conn., headquarters.

The center enables GDC to monitor users' private nets, compare alarm data against customer-defined thresholds, perform diagnostics and take steps to repair problems, including contacting carriers and dispatching field engineers.

**RAD Data Communications** recently unveiled a voice multiplexer that enables simultaneous transmission of four voice channels over Digital Data Service lines at 56K, 64K or 128K bit/sec or through the high-speed channel of a data multiplexer.

Dubbed the Vomux-4, the mux is priced at \$1,600 and is available now. ☐

## Users air PCN beefs with top lawmakers

*continued from page 13*

concern about the possibility of the FCC reallocating to other users frequencies used by the state police.

"It would cost Arkansas taxpayers millions to replace this communications network with a higher radio frequency microwave system that would not be as effective as the current system," Bumpers said. The state has spent \$25 million in the past five years building the net and estimates that a frequency change could cost \$20 million to \$100 million.

Microwave users in Oregon expressed to Republican Sens. Bob Packwood and Mark Hatfield their concerns about the possible reallocation of frequencies from existing users to potential PCN operators.

In a jointly written letter to Sikes, the senators stated, "[Several constituent utilities] have told us [that] the loss of the 2-GHz band would have significant and serious effects on the electric, gas and water utilities, the petroleum and railroad industries, and state and local governments.

"While we understand your interest in ensuring that adequate spectrum is available for emerging technologies, we hope the commission considers the impact of its decision on current users," the letter said.

The senators asked the agency to consider finding adequate replacement spectrum for displaced users, provide compensation to dislocated operators and

implement its plan in a reasonable time frame. Other groups, including the American Association of Railroads (AAR), plan to follow the lead of other microwave users and lobby on Capitol Hill. AAR comprises several small railroads as well as 14 large ones.

"AAR members are distressed at the prospect of a frequency change," said George Petrutsas, a partner with Fletcher, Heald & Hildreth, a Washington, D.C. law firm that represents AAR. "They are not convinced that the FCC has looked hard enough at the problems a frequency change would create.

"If the FCC doesn't start listening to this industry, the industry will go to [Capitol] Hill to visit their senators and congressmen," Petrutsas said. "AAR members may start pushing for legislation that would [prevent] a frequency change."

One broad-based group, the Southern Governors' Association, points out in a resolution that state law enforcement operations, emergency responders and public utilities have made substantial investment in facilities and equipment necessary to use the 2-GHz frequency.

"The investments have been made in recognition of the limitations in alternative methods of transmission for public purposes," the group said. The Southern Governors' Association "opposes any effort to provide additional frequency access by means of reassigning what is currently assigned for state, local and utility uses." □

## IBM exec shares plans for router

*continued from page 7*

it doesn't specify anything about how you set up connections or allocate bandwidth or anything like that. The same can be said of [Asynchronous Transfer Mode].

We've taken the PARIS research and begun to flesh it out in terms of the algorithms and control flows needed to really provide a dynamic high-speed packet network. It's things like bandwidth managers — being able to take a gigabit pipe and guarantee pieces of it to certain applications and manage that to dynamically increase and decrease bandwidth on demand. It's providing congestion control functions so an application cannot overrun the network.

The standards bodies are starting to look at [those issues]. We hope to work with them and try to head the industry in a concerted direction.

**IBM has been saying for some time it will support such interfaces as T-3 and FDDI on the 3745 and that there will be a migration to these high-speed interfaces to protect users' investments. Is that still the case as you go to fast packet?**

Yes. At some point, you obviously need adapters to support the really high speeds. It's going to require some new technology, and the right way to do that is to preserve the software interfaces. If a customer wants to use frame relay, give them frame relay but later give them a higher speed frame relay. Maybe the higher speed frame relay requires a new adapter, but the existing software still runs.

**I've heard you talk about the inte-**

**gration of this fast packet architecture with application layers. What do you mean by that?**

What I meant was the integration of signaling protocols. This fast packet network will innately understand the addressing and routing structures of OSI, TCP/IP, SNA and other protocols we need to support.

Rather than doing a port-to-port definition across the high-speed router network, you want to make that a dynamic operation and allow the router network to discover the best path.

The main point is we're trying to design the architecture so you're not required to do the routing in Layer 3 processor cycles. You want the protocols so they can be implemented in hardware for really optimized high-speed switches.

That's where you want to change control flows. In APPN, for example, a lot of control flows are broadcast to all of the network nodes and every network node sees them. In this fast packet environment, you can use spanning trees, which means you only send [control flow data] to the nodes that need it.

**Is that what you were getting at when you mentioned enhanced APPN or APPN+ earlier?**

APPN+ and then fast packet APPN are these types of enhancements, incrementally added. We're trying to show our customers that SNA has been a good investment for them, that we're going to do APPN across the board to make the networks perform better and easier to administer, and then we're going to enhance APPN with some of these fast packet techniques over time — not all at once, but in a good priority order — that will make APPN run at high speeds and route multiple protocols. □

## Firm offers pack to ease system access

*continued from page 13*

software that works in the same manner and enables users to access an IBM host from their PC without entering another ID and password.

The software developer's kits allow users to link PC/DACS to applications to create more customized solutions. For example, users could build a secure user-designed password scheme for using the same logon to access their specific PC, LAN and mainframe applications, Worthen said.

PC/DACS is a security software package

available for OS/2, MS-DOS and Windows workstations. It is designed to protect against accidental or malicious loss of data or programs, and provides for user ID and authentication, session time-outs, encryption and boot protection.

The SSO products will be available in the first quarter of 1992. A 25-user site license for each tool is priced at \$500. The software developer's kits have not yet been priced but is expected to cost between \$2,000 and \$3,000 for a 25-user license, the company said. PC/DACS is priced at \$4,000 for a 25-user license.

For more information, contact Pyramid at 70 Inwood Road, Rocky Hill, Conn. 06067, or call (203) 257-4223. □

## IBM offers info manager for VM host

*continued from page 13*

decessor for PROFS, it will be offered on a Product Request Price Quotation (PRPQ) basis only, Early said, which means its price is negotiated on a case-by-case basis.

### Software for Windows users

IBM also announced OfficeVision/DOS for Windows, which is PC software that provides a Windows-based GUI to OfficeVision/2 LAN.

The product lets Windows users run OfficeVision/2 LAN applications, Early said, by enabling a Windows-based PC to appear as an OS/2 workstation to the OfficeVision/2 LAN applications.

OfficeVision/DOS for Windows is also available now on a PRPQ basis. According

to Early, its price per workstation is in the \$150 to \$200 range.

The new Presentation Manager Office/2 product consists of both host and OS/2-based software that together provide a Presentation Manager-based GUI, which users can employ to access some OfficeVision/MVS functions. The product supports 3270 terminal emulation and lets an OS/2 user employ a mouse and icons to access host-based E-mail services, file transfer, file cabinet and calendar functions.

Available now, Presentation Manager Office/2 costs \$6,670 for host software, \$230 for the first copy of OS/2 software and \$210 for each additional copy. □



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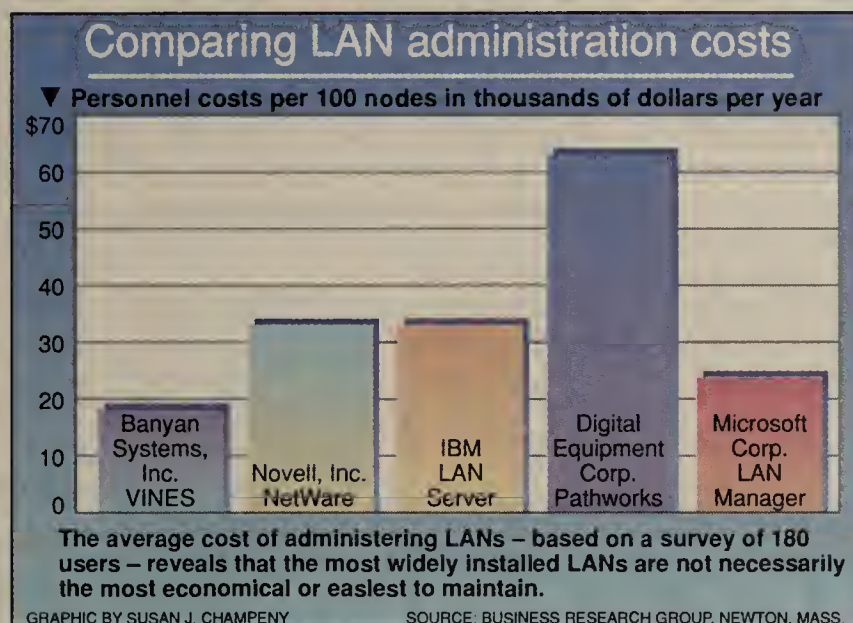
# LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

## Worth Noting

“Development of client/server [applications] today is only a drop in the bucket. Within six to seven years, client/server will become the platform of choice as companies continue to downsize.”

**Stuart Woodring**  
Director of software strategy  
research  
Forrester Research, Inc.  
Cambridge, Mass.



## VINES prevails in survey of LAN operational costs

Hidden LAN costs loom as issue in tight economy.

By Timothy O'Brien  
West Coast Bureau Chief

NEWTON, Mass. — A newly released survey on the costs of operating personal computer local-area networks concluded that Banyan Systems, Inc.'s VINES network operating system is less expensive to operate on an annual basis than other software.

“The Hidden Costs of PC LAN Management,” which was conducted by the Business Research Group (BRG), based here, asserts that life cycle operating costs for LAN operating systems will become a hot topic over the next 18 months as belt-tightening measures force users to closely scrutinize the costs of operating their LANs.

“As PC LANs increasingly be-

come an integral part of the enterprise internetwork, corporate MIS will become more assiduous in conducting life cycle cost analyses when evaluating NOS environments,” said Kevin O'Neill, vice-president of BRG.

The survey of 180 LAN administrators managing large, complex LAN installations with at least three servers and 100 workstations, concluded that VINES “was perceived across the board as being the easiest and least time-consuming” to operate and maintain.

The study examined the administration costs of five leading network operating systems: VINES, Digital Equipment Corp.'s Pathworks, IBM's LAN Server, Mi-

(continued on page 16)

## Firm intros E-mail tool for NetWare

By Joanne Cummings  
Staff Writer

PROVO, Utah — Folio Corp. last week unveiled software that helps electronic mail users on Novell, Inc. NetWare local-area networks manage the storage and retrieval of messages.

The product, called MailBag, enables NetWare users to index and archive messages to a personal queue on a LAN server for later retrieval, rather than saving them to a local file or sorting them in a printed file.

MailBag consists of software that resides on the user workstation and the LAN server. It takes advantage of the data retrieval engine found in NetWare's Help

Utility to manage access to each user's “infobase.”

The infobase is a database residing on the server that holds a user's E-mail messages in fully indexed format, enabling users to search for messages using a key word, phrase or number.

Most E-mail packages store copies of messages in a user's E-mail inbox or outbox queue. With MailBag, users can archive the messages by opening them from those queues and pressing a single key within the client-resident portion of MailBag.

The software then routes copies of the messages to the server's MailBag queue, where they are held while the MailBag server program indexes and routes them to the appropriate user's infobase. The server program also compresses the messages to half their size to conserve space in the infobase, which can hold 2Mbytes of information.

When the messages are sent to (continued on page 16)

## Sun bolsters links to SNA, DEC networks

Key aspect is 16M token-ring support to access SNA hosts, wide array of DEC terminal emulation.

By Caryn Gillooly  
Senior Editor

MOUNTAIN VIEW, Calif. — SunConnect last week unveiled new and enhanced products that will ease the integration of Sun Microsystems, Inc. client workstations into IBM and Digital Equipment Corp. networks.

The crux of the announcement is newly added token-ring support for Sun workstations and greatly increased IBM Systems Network Architecture connectivity. This will let customers in large IBM shops, for example, tie their scalable processor architecture (SPARC)-based machines running Sun's Solaris operating system to existing SNA hosts.

Until now, Sun provided limited token-ring capabilities in the form of 4M bit/sec token-ring support that has only been available since August.

“Eighty percent of our customers that want token-ring [products] will use them with an [IBM] SNA host, while 20% will use them with TCP hosts,” said Laura Lilyquist, product line manager for SunConnect, a Sun business unit based here. “So we really needed to sync up our SNA software with the token-ring support. We needed enhanced SNA connectivity.”

### New and improved

The new products are the SunLink Token Ring Interface/SBus (TRI/S) and the SunLink TE320 terminal emulator. Enhancements to existing products include new versions of SunLink SNA 3270, SunLink SNA Peer-to-Peer, SunLink CG3270 and SunLink Channel Gateway.

The SunLink TRI/S, a switchable 4M or 16M bit/sec token-ring board, takes up one slot in a SPARCstation. It is the first 4M or 16M bit/sec token-ring interface for SBus-based SPARC systems.

With the new product, administrators will be able to deploy Sun systems on 4M or 16M bit/sec token-ring local-area networks and run Transmission Control Protocol/Internet Protocol and SNA software on those Sun machines. “SunLink TRI/S will enable SPARC systems to be integrated into industry-standard token-ring LAN environments, including those running IBM's SNA,” said Cheryl Vedoe, vice-president and general manager of SunConnect.

The SunLink TE320 is terminal-emulation software for SPARCstations. The package lets SPARCstations running Solaris emulate DEC VT-320, VT-220 and VT-100 terminals. It also lets the user cut and paste data between DEC's DECWindows and Sun's OpenWindows graphical user interfaces. For Sun users, this means access to DEC applications through a familiar windowing environment.

### Product enhancements

Topping the list of enhanced products is the SunLink SNA 3270 7.0 communications gateway, a software-based package residing on a nondedicated computer that provides access to SNA-based IBM mainframes. The two new features included in this version are token-ring support and the addition of the High Level Language Application Program Interface (HLLAPI) software.

As with the SunLink TRI/S, the token-ring support will let SPARC workstation users access IBM 3270 applications over a token-ring network. The HLLAPI software can be used by developers to create user-friendly personal computer-type front ends to otherwise cryptic 3270 applications.

The second enhanced product is SunLink SNA Peer-to-Peer. This is a software-based application development package that includes an SNA communications gateway to manage Advanced Program-to-Program Communications and an API to develop LU 6.2-based applications. “SNA Peer-to-Peer is basically an application development platform for third parties,” Lilyquist said.

SunLink SNA Peer-to-Peer Version 7.0 not only features new token-ring support, but includes an IBM NetView interface.

The NetView interface can forward alerts and alarms from Sun's SunNet Manager management console to the NetView console and will let the NetView administrator take action within a Solaris-based work group. Previously, these alerts and alarms could not be forwarded to the NetView console.

The interface also includes its own SunNet Manager proxy agent for managing the Sun-to-SNA gateway by the SunNet Manager.

The final two product enhancements are the SunLink (continued on page 16)

## VINES prevails in survey of LAN costs

continued from page 15

Microsoft's Corp.'s LAN Manager and Novell, Inc.'s NetWare. Banyan contributed funding to the study.

Of those sites surveyed, 51% of the LANs were either interconnected with other LANs or integrated with host-based networks.

Using a list of 11 commonly performed tasks, such as adding a new user, installing a server, changing a network service or performing an upgrade, BRG estimated the time it would take to perform each of these tasks on a networkwide basis.

BRG then used the annual personnel costs for administering a 100-node net to

project the annual operating expenditures for each of the different network operating systems.

At a cost of approximately \$18,000 per year to support 100 users, VINES came in as the least expensive LAN to operate and maintain, followed by LAN Manager with roughly \$24,000 in yearly costs.

NetWare, on the other hand, required an annualized rate of over \$30,000 per 100 users, showing there could be significant cost differences over the life cycle of a network in terms of operating expenditures (see graphic, page 15).

LAN Server support costs ranked about

the same as NetWare, and Pathworks operating costs were the highest at more than \$60,000 per year. However, network administrators at those sites were generally saddled with the management of mixed PC LAN and host-based network environments, making direct comparisons with PC LAN-only configurations difficult.

While four of the five network operating systems ranked differently for each task studied, VINES LAN administrators consistently reported taking the least time to perform the job.

In adding or changing user accounts or adding a network printer, for example, survey participants agreed that the task is performed relatively easily across the different network operating systems. But

when it came to adding a network server, VINES and LAN Manager led the ratings. Under the topic of adding a networkwide service, VINES led the pack, with NetWare trailing all others.

Banyan officials said the survey confirms their position that the cost of network administration will be less in a network designed for enterprisewide networking than in a departmental or work group-oriented LAN.

"We feel this cost of ownership issue has been overlooked for years," said James D'Arezzo, Banyan's vice-president of marketing. "This study validates our claims that a network based on a distributed architecture such as VINES is easier to administer and manage." ■

## Firm intros E-mail tool for NetWare

continued from page 15

the infobase, they are grouped by recipient, date of transmission or receipt, archival date and topic.

Users who need to access an archived message type MAILBAG, press the space bar and type a key search word. The software, using the help retrieval engine, instantly retrieves the requested message.

MailBag supports five popular E-mail packages by providing file format conversion from those packages to the MailBag file format. These E-mail packages are Action Technologies, Inc.'s The Coordinator, Da Vinci Systems Corp.'s Da Vinci eMAIL, Lotus Development Corp.'s cc:Mail, Microsoft Corp.'s Microsoft Mail and WordPerfect Corp.'s WordPerfect Office.

It is also compatible with Folio VIEWS and VIEWS Personal Edition. Using these software tools, users can edit, annotate, group and link data within the infobase.

Because the data retrieval engine uses 384K bytes of random-access memory, the firm recommends that the product run on workstations and servers with at least 512K bytes of RAM. MailBag supports all versions of NetWare except NetWare Lite.

Available now, MailBag costs \$295 for a 25-user license. Multiple 25-user licenses must be purchased to add users. ■

## Sun bolsters links to SNA, DEC networks

continued from page 15

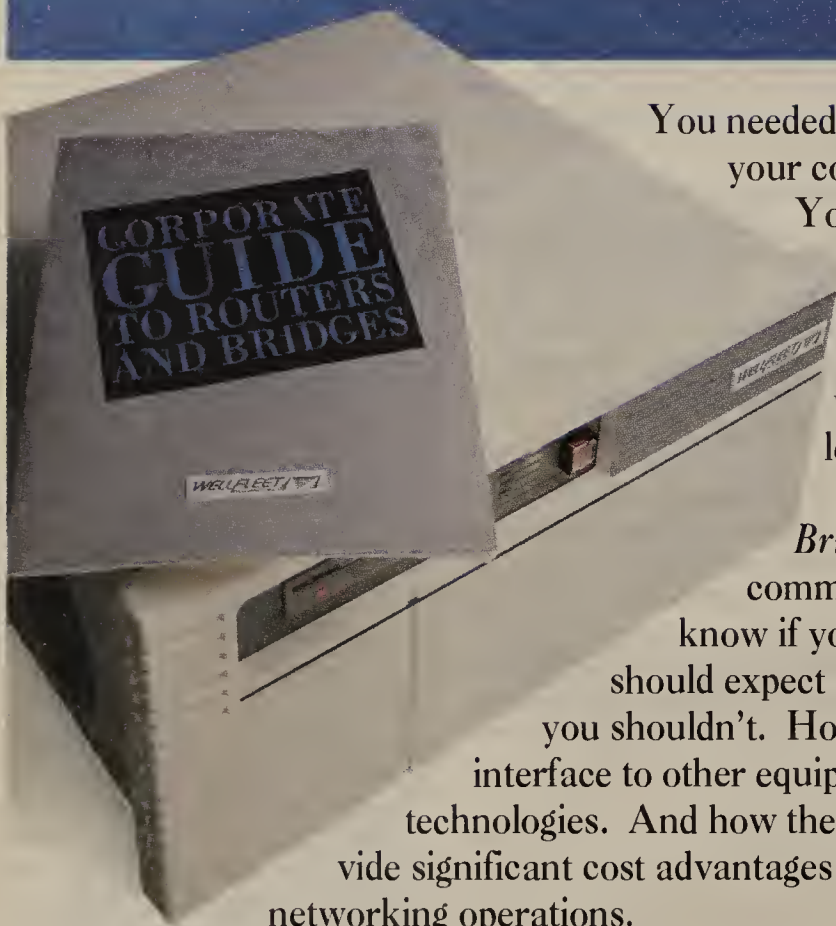
CG3270 Version 7.1 color graphic terminal-emulation package and the SunLink Channel Gateway Version 7.1, a hardware/software product for connecting SPARC servers to an IBM mainframe block multiplexer channel for bulk data transfer.

The new version of the SunLink CG3270 offers support for Telnet, letting TCP/IP users open Telnet sessions from their SPARC-based desktop workstations and interact with applications on remote mainframes running TCP/IP.

The new version of the SunLink Channel Gateway is specifically for Sun's new SPARCserver 600MP, a server with multiprocessing capabilities.

SunLink TRI/S and SunLink TE320 are available now for \$1,195 and \$700, respectively. SunLink SNA 3270 is available now for \$3,300. SunLink SNA Peer-to-Peer 7.0 is expected to be available in February for \$6,600. SunLink CG3270 7.1 and SunLink Channel Gateway 7.1 will cost \$750 and \$22,000, respectively. Both are expected to be available in February. ■

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# MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

## Worth Noting

“Our goal is any-to-any connectivity. We intend to move fully to OSI as quickly as possible to remove ourselves from being held hostage by any proprietary system.”

**Art King**  
Senior operating systems specialist  
PacifiCorp Electric Operations  
Portland, Ore.

## Users want better tools for migration to open systems

Survey respondents say vendor products lacking.

By **Wayne Eckerson**  
Senior Editor

MENLO PARK, Calif. — Users from leading companies around the world said they plan to implement open systems in the future but want vendors to improve the quality of the open systems products they currently offer, according to a new survey.

The survey showed that users have placed a high priority on implementing client/server applications and integrated network management systems but feel that vendor offerings supporting these and other open systems efforts fall far short of their needs, creating a so-called quality gap.

“The good news is that people are actively looking to implement open systems in mainstream computing environments. The bad news is that users aren’t very satisfied with the choice of products,” said Bob Lewin, vice-president of North American operations for X/Open Company, Ltd. in Menlo Park, Calif.

Titled “The 1991 World Sur-

vey on Open Systems,” the survey was commissioned by X/Open Company, Ltd., an open systems consortium of 40 computer and software companies and 40 user firms. The research was conducted by DMR Group, Inc., a Toronto information technology consulting firm.

The survey is based on interviews with 237 senior information technology managers who are active participants in open systems groups and activities. The managers come from a broad cross-section of companies in North America, Europe, Japan and Australia, which together spend more than \$120 billion on technology annually.

The survey results were surprisingly similar from one geographic region to another. The survey asked users about issues affecting their company’s use of open systems, including architectural decisions, business considerations, technology requirements and migration plans.

(continued on page 18)

## Association Watch

Allied-Signal, Inc., The Goodyear Tire and Rubber Co. and 20 individuals recently received the **Automotive Industry Action Group’s (AIAG) Outstanding Achievement Award** for their contributions to the productivity of the North American auto industry via the use of electronic data interchange.

The awards credit Allied-Signal and Goodyear for leadership and accomplishment in making the North American automotive industry more productive and internationally competitive.

The AIAG represents virtually all the U.S. vehicle manufacturers and more than 600 principal automotive vendors.

The Ordernet Services Division of Sterling Software, Inc. recently announced **The EDI Center’s** schedule of classes for 1992.

The EDI Center offers a series of electronic data interchange educational and training programs designed to aid users in the various facets of EDI planning and implementation.

The courses, presented by professionals with hands-on EDI experience, include Team EDI: Building a Business and Technical Partnership; the Business Side of EDI Implementation; Building a Reliable EDI Audit and Controls System; and Trading Partner Expansion Strategies.

For more information, contact The EDI Center at (800) 677-3342. ☐

## EXECUTIVE BRIEFS

BY SALVATORE SALAMONE

**Remedy for Friday the 13th virus.** Last week passed without the release of another Friday the 13th movie. But chances are that many net managers were dealing with a horror of another kind: Friday the 13th viruses.

The most common virus to appear on that day is a form of the Jerusalem virus, a common virus responsible for 44% of all infections, according to a recent Dataquest/National Computer Security Association (NCSA) virus prevalence study of 600 user sites.

Strains of the Jerusalem virus, which infect COM and EXE files, typically increase file size, slow down a personal computer and delete files. If any of these things occurred last Friday, you may have a virus infection to clean up.

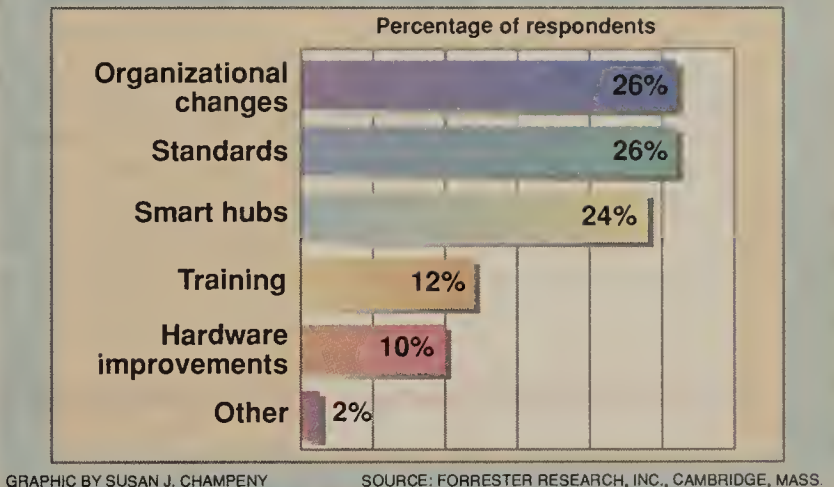
If you find you are infected by a Jerusalem virus, the NCSA suggests the following:

- Shut off the infected machines, then reboot each from an uninfected write-protected diskette. If you do not have such a disk, then boot from a disk that has no AUTOEXEC.BAT or CONFIG.SYS file.
- If the virus has erased any program, use a utility that can restore the files.
- Run a virus scanner. Nearly all scanners are able to identify a file infected by the various Jerusalem strains. Some scanners offer removal tools that allow you to remove the virus from infected files. With such products, there is no need to delete files or reformat the disk.
- After an antivirus product has removed the virus from all the files, scan everything again. The Jerusalem virus will reinfect EXE files, and a few scanners will only remove one copy of the virus on each pass.

For more assistance or information, contact NCSA at (717) 258-1816. ☐

## Easing net management

A Forrester Research survey of 50 Fortune 500 companies shows that organizational changes such as centralized LAN management and improved coordination between information systems and end users can be as important to simplifying net management as technical advances.



## Landscape changing for net execs of '90s

Forrester director says executives who do not plan for internet environment will be left behind.

By **Maureen Molloy**  
Staff Writer

BOSTON — Network executives will need to refocus their networking strategies and cultivate new skills in order to successfully implement enterprise networks during the 1990s.

The foundation network of the 1990s will be the local-area network internet, which may coexist with users’ existing IBM Systems Network Architecture networks, said Janet Hyland, director of network strategy research at Forrester Research, Inc. in Cambridge, Mass. Hyland said net executives must redefine their network planning and strategies to prepare for the emergence of this new environment.

“Network managers must understand the network of the 1990s or be replaced by someone who does,” she said. “They must understand how to implement this new technology that will significantly impact the company’s bottom line.”

Speaking before more than 200 users at a recent Forrester Research-sponsored Technology Management Forum here, Hyland warned that the new environment cannot be implemented with an SNA mind-set.

“Managers cannot take what they know about 3270 multidrop networks and apply it to the internet,” she said. “If they do, they’ll be woefully constrained in this new environment and wind up with a network that’s too hierarchical.”

Managing this new net infrastructure requires skills that are lacking in many large informa-

tion systems (IS) organizations today. A recent survey of network executives at the largest 1,000 U.S. companies uncovered a dearth of managers skilled in the areas of LANs and LAN internetworking.

Today, about 40% of these firms have routers installed in their networks. Of that installed base, only about half were deployed with the aid of the IS department.

According to Hyland, while many IS shops were busy managing traditional networks over the last few years, end users were gaining more control of the “new corporate network,” deploying LANs and internetworking gear to link those LANs to other end-user departments.

This ad hoc deployment has resulted in costly and chaotic network growth throughout many organizations.

“Managers must get involved and take control of these LAN internetworks that have grown in a haphazard, anarchic fashion,” Hyland said. “It’s too important to an organization’s business objectives to be done otherwise.”

By centrally architecting and managing the network, net managers can significantly reduce network costs. That will result in greater visibility and clout for the IS department within the organization.

The IS department can trim costs chiefly by eliminating redundant internet links, Hyland said. Central management of the internet will also enable network managers to obtain volume discounts. (continued on page 18)

## Landscape changing for net execs of '90s

*continued from page 17*

count rates from the local and interexchange carriers.

Additionally, central management becomes a higher priority as more important applications are deployed across the net.

"The goal is to have transmission that is planned, manageable and reliable," Hyland said. "Having someone responsible for repairing failed links isn't enough. Plans must be put in place to prevent lines from going down in the first place."

Once control of the internetwork is brought under the IS umbrella, network managers will be able to deliver enter-

prisewide services. Many network offerings today — such as electronic mail and directory services — cannot be delivered unless they are coordinated by IS.

Hyland advises net managers to draft formal plans to support the new corporate network. Because the burgeoning internet market is in upheaval, a five-year strategic plan is no longer a feasible option. Users must instead make pragmatic decisions based on a maximum 24-month plan.

Next, the network manager must win the support of end users and build a coalition to coordinate efforts. One step along the way is to establish a network-savvy help desk that can act as a liaison between departmental LAN administrators and the company's technical support staff.

The new corporate network will be "multivendor, high-performance and LAN-based," Hyland said. "The most useful tools for managing the future corporate network will also be LAN-based."

It will not be an easy transition to this network environment, Hyland warned, but those net managers that can successfully make the move will be rewarded.

"Uncomfortable decisions will need to be made that will cause controversy in many organizations," she said. "There are new vendors to meet and new technologies to learn. And it's all moving at an incredibly fast clip. But the new network will be key to an organization's competitiveness, and the manager who can plan it successfully will gain a highly visible profile." ■

## Users want better open systems tools

*continued from page 17*

There was general agreement among respondents in defining open systems. Seventy-one percent said open systems are based on vendor-independent specifications, while 29% defined open systems as supporting a heterogeneous computing environment.

Almost half of those surveyed (49%) said their companies have a general policy of using products and technologies based on standards whenever possible. Another 32% said their companies use standards-based products only in certain situations. The remaining 19% said their companies are considering implementing a policy regarding the use of standards.

### Quality gap

The survey asked users to rate on a scale of 1 to 10 the importance of certain open systems technologies to their organization. Client/server applications topped users' priority lists with a score of 8.2. Following closely were network security (8.1), integrated system and network management (7.9) and electronic data interchange (7.5).

The remaining eight technologies included on-line transaction processing (7.4), graphical user interfaces (GUI) (7.4), computer-aided software engineering (7.4), distributed databases (7.4), application program interfaces (API) (7.2) and fourth-generation languages (7.0).

Users gave much lower scores when asked to rate the quality of currently available products related to these technologies. Only one of the 12 technologies, GUI, received a product quality score higher than 5, revealing a wide gap between the open systems technologies users want and the products vendors are delivering.

According to George Shaffner, X/Open's chief operating officer, the survey points to a "quality gap" that underscores the need for vendors to provide high-quality, cost-effective standards-based products.

The technologies with the largest gaps between importance and product quality were network security (4.3) and integrated network management (4.2). Those with the smallest gaps were GUI (1.7), fourth-generation languages (2.4) and APIs (2.5).

The survey also showed that an overwhelming majority of users plan to migrate to open network protocols and operating systems at the expense of proprietary systems.

Almost 80% of those surveyed said they will increase their use of products based on the Open Systems Interconnection network model in the next three years, and 60% plan to implement the Open Software Foundation, Inc.'s Distributed Computing Environment. Only about 10% said they will rely on IBM's Systems Network Architecture in the future.

About 90% of the respondents said their companies plan to increase their use of Unix in the next three years. Approximately 35% said their companies plan to increase their use of MS-DOS in the next three years, about 30% said they will use OS/2, and about 28% said they will use Apple Computer, Inc.'s Macintosh.

Less than 10% of those interviewed said they will rely more on Digital Equipment Corp.'s VMS or IBM's MVS and VM operating systems. ■

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# GLOBAL NETWORKS

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## Worth Noting

In 1990, AT&T received 15% of its \$37.3 billion in total revenues from international operations. Between 60% and 65% of its international revenues were from the provision of international services, according to a spokesman for the carrier. This year, after acquiring NCR Corp., AT&T is expected to derive more than 20% of its revenues from international operations.

## World News

AT&T last week began offering commercial fractional T-1 service to Mexico. Previously, the carrier only provided 56K bit/sec and T-1 private lines to that country.

In Mexico, users can access the new service via private-line service from the country's monopoly carrier, Telefonos de Mexico, S.A. de C.V.

In a separate action, AT&T last week said it signed a contract to install a 290-km fiber-optic network in Chile that will run at 565M bit/sec and link the cities of Curico, Rancagua, San Fernando, Santiago and Talca. Chile's national long-distance carrier, Empresa Nacional De Telecomunicaciones, S.A., will use the fiber network to provide network services.

Peter Madsen, president of Newbridge Networks, Inc. of Herndon, Va., last week said his company has sold multiplexers to 23 carriers in 13 countries that are using the equipment to build digital overlay nets. The countries include Brazil, Chile and Mexico.

France Telecom said it recently linked its Numeris Integrated Services Digital Network service with the Swiss PTT's Swissnet ISDN offering. □



AT&T Vice-Chairman Randall Tobias

## AT&T's Tobias outlines carrier's int'l vision, plans

Exec aims to increase global private net offerings.

**Q&A** Riding a wave of escalating interest in international business, AT&T is moving aggressively to increase its entire international operations, including its presence in the global private net market.

AT&T's international expansion is something of a departure from the carrier's historical stance because, until the early 1980s, the carrier's ability to provision international private lines was limited by regulations that have since been dropped.

Last summer, AT&T appointed Vice-Chairman Randall Tobias to coordinate the international efforts of the carrier's 21 business units.

Tobias recently spoke with *Network World* Senior Editor Barton Crockett in Basking Ridge, N.J., about the impact of AT&T's international growth on its ability to provide global networks to users.

### Could you please describe your international responsibilities?

In 1988, we put in place a series of business units that have profit and loss responsibility for various segments of the marketplace on a worldwide basis. My responsibility is for all the activities [of these business units] outside the U.S.

The reason we decided to put a vice-chairman in this role, as well as to create the role at all, was because of our belief that one of the major growth engines for this company is going to be business outside the U.S.

At the moment, about 16% to 17% of the revenue from AT&T's traditional business comes from outside the U.S. When you add NCR [Corp.] into that, about 22% of our revenue is from outside the U.S. It is our aspiration to get

about half of our business from outside the U.S. by the end of this decade.

### What is the split between services and equipment on your international business?

The predominance of our business outside the U.S. has been services. Our infrastructure business [sales of central office switches and other equipment to foreign carriers] in 1990 passed \$1 billion. To date, we have not had a major presence outside the U.S. in the equipment we sell to end users, but that is an aspect of our business we intend to grow.

### What is the status of AT&T's plans to build a pan-European network to provide value-added or basic network services?

We will continue to look at a variety of alternative arrangements. And I certainly wouldn't rule out the provision of that service in Europe. But neither am I prepared to announce anything.

I think it would be fair to say it is our expectation to — in a reasonably aggressive way — do whatever it takes to meet the needs of our multinational customers.

And I think that many of them want the same services and applications [available abroad] that they have become used to in the U.S. They might even like to get one accurate bill on a global basis. But it's a very complex matter for customers and for us to make that happen. The way we execute this is something that will develop over time.

In some cases, I think we will deliver parts of that equation with resources we have or will develop internally. In other cases, we'll do it through partnerships (continued on page 20)

## Firm expects France to OK VSAT service

If Alpha Lyracom gets green light, it could offer int'l, domestic VSAT service there by mid-1992.

By Barton Crockett  
Senior Editor

GREENWICH, Conn. — Alpha Lyracom Space Communications, Inc. recently said it expects the French government will soon approve its request to provide domestic and international VSAT satellite services in France.

The very small aperture terminal service, which could become available by the middle of next year, would be attractive to users that want to bypass weak terrestrial facilities or avoid dealing with monopoly carriers, according to industry observers.

Lucian Rapp, an attorney with Serra Ferry, the Paris law firm representing Alpha Lyracom, said he expects that within a month, the French government will approve Alpha Lyracom's petition to provide VSAT services in France, as well as between France, the U.S. and other countries that allow VSAT competition.

Alpha Lyracom would be the first company authorized by the French government to compete with France Telecom in the provision of two-way VSAT services. Even though the French government last summer said it would allow competition in those services, it has not licensed any companies to compete in the market, according to officials in France's Directorate of Regulatory Affairs in Paris.

Alpha Lyracom plans to provide services via a company-owned satellite that is able to transmit to and receive signals from the eastern U.S., Latin America and Western Europe. This means users could use Alpha Lyracom to link French offices into VSAT nets spanning three continents.

"I think this will be very significant," said Reverge Anselmo, son of Alpha Lyracom founder and Chief Executive Officer Rene Anselmo. "It will be the first two-way VSAT license we've obtained in Europe."

Reverge helps his father run Alpha Lyracom, which expects revenues of about \$30 million and profits of \$12 million to \$13 million this year, the elder Anselmo said. The company provides international television broadcast services and provisions private networks to about 50 user companies, he added.

Currently, Alpha Lyracom

provides private-line and VSAT services between the U.S. and several Latin American countries, including Colombia, Panama and Peru, said Guy Lanni, vice-president of Alpha Lyracom's digital services division. The company also provides point-to-point, digital private-line services between the U.S. and a handful of European countries, including Germany.

But Alpha Lyracom does not yet provide European VSAT services in which a master earth station transmits data to and receives traffic from multiple remote earth stations measuring less than a few meters in diameter. Rapp said Alpha Lyracom does not currently provide any satellite services in France.

"We believe there is a growing marketplace interest in VSATs, not only between Europe and the U.S., but between the U.S. and Latin America," Lanni said.

### Early interest

Reverge Anselmo said two French supermarket chains, which he declined to name, have already approached Alpha Lyracom about obtaining VSAT services within France. Lanni said the firm could begin providing those services within six months.

Jonathan Ogilvie, director of sales at Lynx Technologies, Inc., an international network consultancy in Little Falls, N.J., said he believes some U.S. users would be interested in obtaining transatlantic VSAT services from Alpha Lyracom but more U.S. users would be interested in VSAT services within Europe.

"The interest is not so much transatlantic because we already have lots of good fiber-optic facilities there," Ogilvie said. "It's more internal to Europe, where the [public network] infrastructure is not so good."

Ogilvie said he is helping a handful of large U.S. companies study the feasibility of building pan-European VSAT networks. It is now much easier to build those nets than it was six months ago because many European countries are moving to allow VSAT competition.

Leonard Elfenbein, president of Lynx, said many European monopoly carriers charge high prices for VSAT services or limit users' ability to install private VSAT nets. □

## Tobias outlines AT&T's int'l vision

*continued from page 19*

with others or through acquisitions.

But the end result needs to make the provision of global services a very simple, straightforward kind of arrangement.

Many people are skeptical about AT&T's ability to partner with other carriers through programs such as AT&T's alliance with British Telecommunications PLC (BT), France Telecom and Kokusai Denshin Denwa Company, Ltd., called ABFK. What do you say to skeptics who say these arrangements do not work?

I think that if, in the final analysis, that becomes reality, then customers will find providers in the market who will meet their needs, whoever they may be.

As we try to understand what customers want on a global basis, we will start from the point of view that the best, most logical partners tend to be the established players around the world. To the degree that we can find ways to meet customer needs in that kind of collaborative way, that will clearly be our choice.

But I'm not certain that we can collaborate in every place on earth. If we can't, we will do what we have to do.

I think, based on past experience, that some level of skepticism [about ABFK] is appropriate. But I think the world is chang-

ing. AT&T is a very different company than it was 10 years ago, and other companies in the industry are very different from what they were.

I think people are increasingly perceiving that working together in collaborative ways is in all our best interests.

**But what has ABFK produced for users?**

I think it is beginning to produce an ability to make applications available and get services installed and maintained in ways that are more responsive than they were in the past. But I'm also saying I don't think we have begun to get to the point where we or our customers want to be in providing those services. We've got to find

ways to more aggressively meet user needs.

**Regulatory reforms are opening up new opportunities for AT&T to provide network services in competition with monopoly carriers abroad. But is AT&T's ability to compete with foreign carriers in the provision of services constrained by your equipment sales to foreign carriers?**

No. That's an issue that's talked about a lot — and has been since divestiture. But I think the fact of the matter is that people increasingly are making mature purchasing decisions based on the best alternative that's available in the marketplace.

**But have any post, telegraph and telephone administrations ever threatened to stop buying equipment from AT&T if you offer services in competition with them?**

I suspect, in a lot of places, if somebody said something like that, it would be unlawful. I also suspect that, over time, there have been concerns expressed, as one would expect, about the strategic intentions of AT&T in various parts of its business. But again, I just don't perceive that it's a significant problem.

**Has AT&T ever thought about splitting its carrier equipment business into a separate company and letting somebody else buy a major stake in that?**

No, we haven't. There have been a number of rumors along those lines over the years. But there's never been any serious high-level consideration of any scenarios that would involve anything along those lines. It's never appeared to be worth spending any time considering.

**BT recently made a splash with its new Syncordia Corp. business unit that is designed to offer global private networks to users. Does Syncordia represent a competitive threat to which AT&T needs to respond?**

I could better answer that if I knew what Syncordia was. I've already commented, in some specificity, on the need for multinational customers to get the benefits of global services. It's just not clear to me where the intent of Syncordia fits in.

**Put yourself in the shoes of a network manager and look to the end of this decade. How are the new services emerging for international communications — including new virtual network and local-area network internetworking services — going to affect global networks?**

I think what we're going to see is an accelerating evolution of more and more services. I think there's going to be an increasing capacity of bandwidth and an increasing ability of consumers to reconfigure that bandwidth in ways that they want it, with as much or as little value added as they want. I read something the other day from [AT&T Bell] Laboratories that would suggest we are currently using only one-tenth of 1% of the capacity — from a technological point of view — available on fiber-optic cables.

I think the constraints [by the end of the 1990s] are going to be more constraints of innovation and creativity in applications than they will be constraints in the availability of technology. ■



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## First Look

### Plexcom airs token-ring bridge with SNMP control

**Plexcom, Inc.** recently unveiled a token-ring bridge that can be managed by Simple Network Management Protocol (SNMP)-compliant network management systems.

The company said it is the first bridge that supports both 4M and 16M bit/sec token-ring networks and offers SNMP management.

The **8039 Local Token Ring Bridge** is a stand-alone unit that has two ports for connecting two token-ring networks. The unit also offers an RS-232 port for providing out-of-band management.

The 8039 provides 153.6K packet/sec filtering and 3K packet/sec forwarding rates on 16M bit/sec networks. Throughput on 16M bit/sec networks reaches as high as 15.5M bit/sec, the company said. The 8039 supports the Spanning Tree Algorithm and is compatible with IBM's source routing protocol.

Available now, the 8039 is priced at \$4,495.

*Plexcom, Inc., 65 Moreland Road, Simi Valley, Calif. 93065; (805) 522-3333.*

### Neon upgrades Ethernet analyzer for Macintoshes

**Neon Software, Inc.** recently enhanced its Ethernet protocol analyzer for the Apple Computer, Inc. Macintosh.

**NetMinder Ethernet Version 2.0**, like the previous version, is software that resides on a Macintosh equipped with an Ethernet card. It captures and decodes Ethernet protocols including Apple's AppleTalk, Digital Equipment Corp.'s DECnet, Novell, Inc.'s NetWare and Banyan Systems, Inc.'s VINES.

New features include an Explain button, which provides context-sensitive information about each protocol decoded by NetMinder, new address-mapping features and real-time display of network data.

Available now, NetMinder Ethernet 2.0 costs \$595. Upgrades for registered users cost \$75 through year end.

*Neon Software, Inc., 1009 Oak Hill Road, Suite 203, Lafayette, Calif. 94549; (510) 283-9771. ☐*

## NetManage airs low-cost IP router

By Maureen Molloy  
Staff Writer

CUPERTINO, Calif. — NetManage, Inc. last week announced low-cost PC-based software that routes TCP/IP traffic over Ethernet, token-ring and Fiber Distributed Data Interface local-area networks.

NetRoute is a Transmission Control Protocol/Internet Protocol router module that plugs into a single slot on a personal computer and handles moderate bandwidth applications, such as network management and electronic mail, less expensively than a dedicated multiprotocol router.

NetRoute resides on any Microsoft Corp. Windows-based PC and must be used in tandem with the vendor's Chameleon software, a set of TCP/IP services that provides file-transfer and terminal-emulation services to PC users.

Although a spokesman for the vendor declined to be more specific, he said the router software has a data throughput rate of several hundred packets per second across seven LANs and supports any combination of network in-

terface cards and serial lines plugged into the PC.

The software only supports static routing, which means the router does not have automatic update capabilities. Instead, the network administrator must manually change the router's address table when necessary.

"The router is up and running simply by plugging another network card into the PC — all for less than \$600," said Dan Geisler, NetManage's director of marketing.

Because it only routes several hundred packets per second, as opposed to conventional routers that typically handle 25K packet/sec, the router is not designed to support high-traffic spurts caused by bandwidth-intensive applications.

NetRoute includes a set of diagnostic tools for identifying glitches and gathering information on TCP/IP network statistics.

The product is shipping as part of NetManage's Chameleon TCP/IP application package, which is based on the Windows Dynamic Link Library. Chameleon supports any network interface card that is based on Microsoft's Network Driver Interface Specification. It costs \$400 and is available now.

For more information, contact NetManage at 20823 Stevens Creek Blvd., No. 100, Cupertino, Calif. 95014, or call (408) 973-7171. ☐

## AT&T EasyLink rolls out secure bank telex software

By Wayne Eckerson  
Senior Editor

PARSIPPANY, N.J. — AT&T EasyLink Services recently unveiled software for IBM Application System/400s that lets banks automate the process of generating and sending secure telex messages.

Called the OfficeAccess Bank Test-key Solution, the software enables AS/400 users to automatically encode a telex message with a security algorithm called a test-key code and transmit it to another bank across AT&T's EasyLink messaging network.

U.S. banks typically use telex to exchange nonformatted messages or to communicate with foreign banks that are not members of the Society for Worldwide Interbank Financial Telecommunication (SWIFT), an international banking consortium that operates a shared global net.

The OfficeAccess Bank Test-key software provides an interface between applications running on the AS/400, the EasyLink

messaging network and Leeson Howe Associates, Inc.'s Telextester PC software, which scans telex messages such as wire transfers and letters of credit and generates test-key codes that banks use to verify the authenticity of the messages.

John Ahearn, vice-president of international banking at the National Community Bank of New Jersey in West Paterson, N.J., said the software has helped his bank automate a job that was previously handled by two clerks, saving about \$75,000 a year in labor costs and improving the accuracy of the bank's telex messages. In addition, the bank no longer has to use its aging telex machines.

The National Community Bank sends about 125 telex messages a day to banks overseas involving the transfer of funds worth approximately \$10 million, Ahearn said.

Banks authenticate incoming telex messages involving money

(continued on page 42)

## Fracdial outfits mux for videoconferences

Multipoint bridge feature lets users economically tie multiple users into a single videoconference.

By Barton Crockett  
Senior Editor

RESTON, Va. — Digital Access, Inc. recently announced a new capability that enables its Fracdial inverse multiplexers to bridge multiple users into a single videoconferencing session.

The firm claims the new Virtual Bridge capability enables Fracdial multiplexers to deliver virtually all the capabilities found in multipoint bridges from leading videoconferencing vendors but much less expensively.

Users can install the Virtual Bridge technology, which consists of new software and a keypad for the Fracdial multiplexer, for \$2,500. By contrast, multipoint bridges from major equipment vendors, such as Compression Labs, Inc. and PictureTel Corp., that link eight to 16 video systems into a single videoconference typically cost \$75,000 to \$200,000.

Without multipoint bridges, videoconferencing systems can only support point-to-point videoconferences.

"What we have is a totally new approach to the multipoint problem," said Peter Beck, Digital Access' chief executive officer. "We deliver plain vanilla features for extraordinarily low cost."

MCI Communications Corp. is considering marketing the Virtual Bridge capability with Digital Access, said Martin Burack, MCI's senior manager of data product marketing in McLean, Va.

Currently, MCI comarkets the Fracdial multiplexers, as well as videoconferencing systems and multipoint bridges from Compression Labs and PictureTel.

Digital Access was founded six years ago but did not begin selling products until this year, Beck said. He said the company is projecting sales of about \$5 million in 1992.

Digital Access' Fracdial multiplexers combine multiple switched 56K bit/sec circuits into a single, high-speed switched pipe.

### Fracdial in every office

Users must install a Fracdial multiplexer with the Virtual Bridge capability with every videoconferencing system linked into a videoconference.

Software in the Virtual Bridge instructs the Fracdial multiplexers to set up a ring of switched

digital links between each of the videoconferencing systems in a multipoint videoconference, according to Beck.

Multipoint bridges are typically configured in a star topology, with digital links stretching from a central bridge to multiple remote videoconferencing systems. Usually, multipoint bridges must use a data service unit or inverse multiplexer to access switched digital links.

### Putting the mux to work

Users must push a button on a keypad that is attached to the Fracdial multiplexer every time they wish to speak. The Virtual Bridge software uses an 8K bit/sec signaling channel on the switched digital links. When a participant pushes the button, the signaling channel gains control of the ring, displaying that person's voice and picture to the other participants.

Beck admitted that the Virtual Bridge supports fewer features than multipoint video bridges. For example, most multipoint bridges enable users to create windows on videoconferencing screens that show every other participant in a videoconference. The Virtual Bridge only enables participants to see the person speaking.

Also, many multipoint bridges enable a speaker in a videoconference to hear low-level audio feedback from every remote participant. The Virtual Bridge option only enables the speaker to hear feedback from the last speaker that controlled the conference.

But for the price, Beck said, many users would be happy with the stripped-down functionality.

Thus far, Beck said, Digital Access has demonstrated the Virtual Bridge to MCI only. But he added that MCI has not yet completed a thorough evaluation to determine if the Virtual Bridge would be interesting to users or if the carrier should comarket the product.

Burack warned that for users with more than 40 sites, the Virtual Bridge may not be cost-effective since it would cost \$100,000 to equip Fracdials at those sites with the Virtual Bridge.

Burack added that the technology is intriguing. "It's definitely not something to dismiss out of hand," he said. ☐

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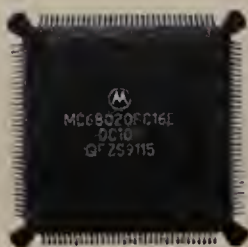


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## PRINTERS . PAGES AHEAD

# OPINIONS

## OUTSOURCING

BY JEFFREY KAPLAN

# Self-sufficiency profits both users and vendors

During the past two years, net managers have looked to outsourcing as a way to off-load a significant portion of their MIS and network operating costs to an outside vendor. Now, however, an increasing number of network managers want to retain a large role in supporting their end users.

Recent Ledgeway/Dataquest research shows that despite all the hoopla about outsourcing, only a small percentage of managers have taken advantage of this tactic.

Additionally, in most cases, companies have used outsourcing vendors only to perform narrowly defined operational tasks, rather than to take on broad-based management responsibilities that have a strategic impact on their organizations.

And while there are few cases of user dissatisfaction with the quality of support received from outsourcing vendors, managers still remain overwhelmingly reluctant to relinquish control of their networking operations to an outside vendor.

Furthermore, many managers have decided that traditional service agreements no longer work in their favor. As network equipment becomes more reliable, the value of a standard service agreement rapidly declines.

Consequently, more managers are turning away from these agreements, preferring to solve their problems on a pay-as-you-go, time-and-materials basis. In fact, they want to go one step further. Many network managers are demanding access to spare parts, training and tools so they can handle their own network problems. A number of vendors are beginning to recognize there is a silver lining to this movement. They have found that revenue can be generated by selling parts and training to managers.

Cost savings can also be gained by giving managers the tools to plan and design their own networks or diagnose and resolve their own network problems. An example of this is network management systems that allow managers to configure their own networks and identify a problem when it arises. Such systems give managers more control and reduce the need for frontline vendor support, enabling vendors to cut or cap the number of times frontline field or telephone support staff are used to solve users' minor problems.

Three years ago, nearly every network vendor was flaunting its network planning and configuration technology, but none would allow managers to acquire the tools needed to design and manage their own networks.

Currently, many vendors are selling network management systems with built-in user self-maintenance capabilities. Is this trend good or bad for managers? As with anything else, there are trade-offs. Managers need to keep two things in mind when vendors offer them a self-maintenance tool: Will it allow them to do the job better than their vendor and will it save them money?

In a growing number of cases, the answer to both questions can be yes. Managers can obtain the resources they need to be self-sufficient by increasing the likelihood that they will satisfy their network performance requirements. In this way, self-maintenance strategies can create a win-win situation for the user and the vendor, while vendors can retain customers and generate cost savings along the way. ■

*Kaplan is a director with Ledgeway/Dataquest, a market research and consulting firm in Framingham, Mass.*

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## EDITORIAL

# Users: all talk and no action on open systems?

During the Industry Power Panel discussion at the recent User's Open Systems Conference, leading network vendors were on the hot seat fielding questions about their commitment to open systems.

At one point in the meeting, from the back of the crowded conference hall, Jerry Johnson, standards analyst for Texas' Department of Information Resources, stepped up to the microphone and fired off a question — not at the panelists but at users in the audience.

Johnson, who is spearheading the state's migration to open systems, asked simply for a show of hands from users who had adopted an open systems migration strategy that includes a requirement to buy open systems products. Sadly, few hands went up.

Johnson's question strikes to the heart of the issue. It doesn't matter what vendors say about

open systems. What matters most is what users do.

Despite pleas for interoperable products and protests about proprietary offerings, unless users are willing to demand open systems compliance through buying power, the open systems movement will continue to move at a glacial pace.

The simple truth that seems sometimes to go unrecognized is that vendors are in business to make money and are motivated by the demands of the market. If users talk open systems but buy proprietary products, then vendors will go happily along making and selling proprietary products. And they will continue to turn the open systems question back on users: "Gee, we've made some open systems products. But no one is buying them."

If users want vendors to make open systems products, users must commit to buying them. Users must commit to an

open systems architecture and demand the open components to make that a reality.

The time for that commitment is now. Profound changes occurring in the network industry may make it much more difficult for users to demand open systems in the future.

Consider this scary but all-too-realistic future scenario discussed in one of network management expert James Herman's recent Future Mapping workshops. By 1997, intense industry consolidation will leave only a handful of major suppliers that push proprietary offerings.

Out of five possible scenarios, both users and vendors in the workshop rated this scenario as very likely to be realized — more likely, in fact, than the realization of open systems.

Today, Jerry Johnson is right to turn the question back to users. If you want open systems, what are you doing about it? ■

# OPINIONS

## REGULATORY AFFAIRS

BY ALAN PEARCE

### FCC will proceed slowly but surely with action on PCNs

It seems that many in the telecommunications industry are bullish on the future of personal communications networks (PCN). Why such optimism? It's said the new services will compete directly with existing wireline telephone service, both local and long-distance, cellular telephone services and operator services segment of the telecommunications industry. And competition is always good for users.

Unfortunately, policy problems regarding the promotion of PCNs are rooted in spectrum scarcity. Wireless technologies rely on spectrum for distribution, and the U.S. is running out of publicly available spectrum for allocation to the provision of mobile services, such as PCNs will provide.

In 1990, the Federal Communications Commission launched a notice of inquiry into personal communications services and networks. The FCC launched the inquiry, rather than a rule making, because it wanted to collect information before actually setting policy. Unlike a notice of proposed rule making, a notice of inquiry doesn't result in new rules or rule changes; it's a method by which the FCC collects information.

In essence, by launching a notice of inquiry, the FCC was buying time — a move that it made deliberately because it had some doubts about the viability of PCNs and realized that spectrum availability was going to be a major problem.

The reaction to the inquiry overwhelmed even the most hardened FCC staffers. More than 100 parties filed comments, including the U.S. government, cable television companies, equipment manufacturers, private microwave companies, local and long-haul

telephone companies, cellular telephone companies, computer companies, state regulators and user groups.

During the inquiry, the FCC awarded more than 125 experimental licenses. However, the FCC's decision to grant these licenses is not a guarantee that it will ultimately approve those services or that the organizations granted those licenses will offer them when the time comes.

In early December, the FCC held a one-day open meeting in which several panels of experts informed the five commissioners about the technical pros and cons of PCNs as well as the regulatory structures under which services could be offered to the public.

In a recently issued policy statement, the FCC said it intends to make an adequate amount of spectrum available for the development of innovative and competitive markets.

Currently, the FCC is embarked on a relentless spectrum search to see whether any of the existing allocations and assignments can be freed up and dedicated to PCNs.

Alternatively, the FCC is betting that Congress will pass legislation, which President Bush will probably sign, giving the agency access to the spectrum currently allocated to the federal government — primarily to the Department of Defense.

To assist with policy formulation, the FCC intends to empanel an advisory committee closely resembling the one that advises the commission on high-definition television and advanced technical standards for television. Also, at the suggestion of Commissioner Andrew Barrett, the FCC's Small Business Advisory Committee intends to investigate how PCNs can provide opportunities for small businesses.

But after all the hoopla and hype have died down, the FCC will at least have to draw up the following two rule makings before it can set final policy:

■ A rule making examining whether PCNs will compete with, or be complementary to, the public switched network.

Public switched network technologies will be investigated to see whether the PCN can be self-contained. However, it is unclear how personal communications services can either enhance or compete with current infrastructures. Only the FCC can develop policies to deal with these difficult and complex issues.

■ A broadly based rule making in which the FCC will analyze a plethora of issues. Those issues include whether existing spectrum can be shared; whether current users of spectrum, such as private microwave users or broadcasters, can be induced by monetary compensation either to move to other spectrum or vacate spectrum; which companies and institutions are eligible to offer services; how the "pioneers preference policy" applies; and whether to mandate that certain areas of the spectrum be set aside for PCN development by local exchange carriers (as there was with cellular telecommunications).

In addition, the agency will consider whether to allow several PCNs to compete in the same service areas (although it seems likely that the FCC will not even consider monopoly provision); what size to make the service areas and how to set them — by market or by geographic region; how to go about licensing PCNs — via lotteries, auctions or comparative hearings; and whether state public utility commissions will be allowed to have any say in overall regulation.

Although the FCC is facing tough decisions regarding how to allocate and assign spectrum as well as how to regulate PCNs, a way forward is being forged — slowly but surely.

The stage is set, and rule-making initiatives could get under way during the next few months. ■

*Pearce is president of Information Age Economics, Inc., a telecommunications research firm in Washington, D.C.*

"IT IS THE WRITER'S PRIVILEGE to help man endure," novelist William Faulkner said. Help your fellow networkers endure by writing an opinion column.

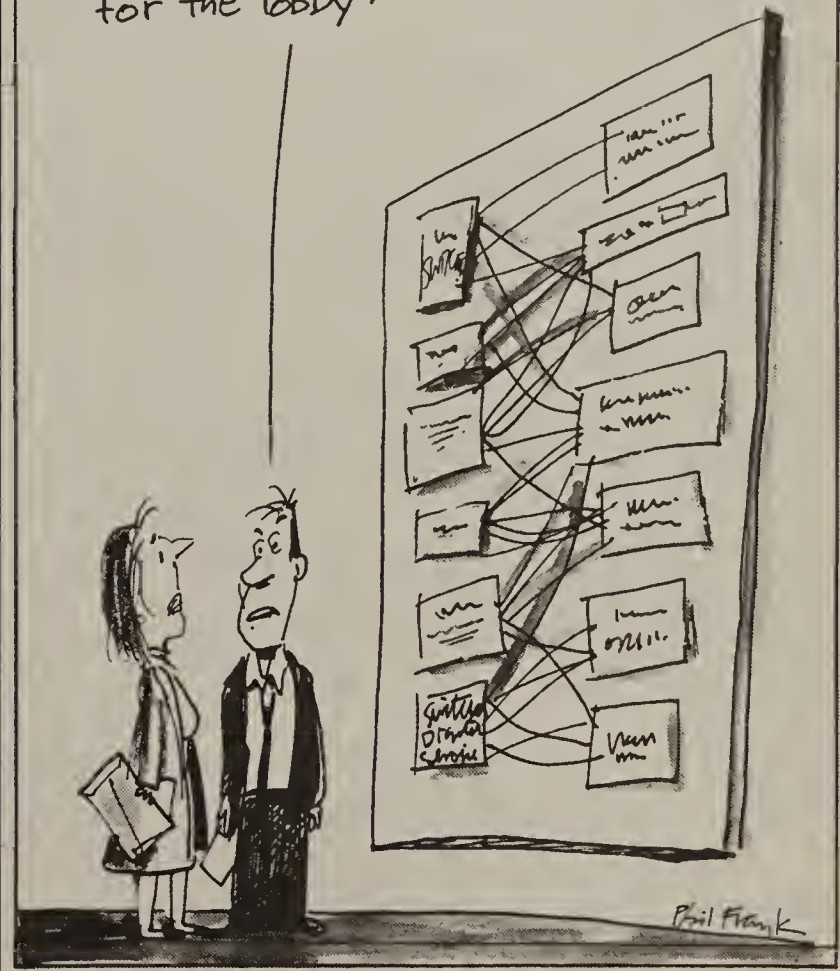
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## TELETOONS

BY FRANK AND TROISE

Bad news, Alice. Turns out this Network Consolidation Plan we've been trying to implement is actually the new piece of modern art the company commissioned for the lobby.



### Enter now for CFI

Network executives are the unsung heroes of many organizations.

They're certainly high-visibility professionals — it doesn't take long for anyone to track down the network manager if something goes wrong. But there is often little recognition for their efforts.

Implementing a flexible network infrastructure that supports key business applications is a lengthy and difficult undertaking that does not offer many chances to bask in the adulation of adoring end users and senior executives.

But there are some opportunities to win recognition for innovative network efforts. One is our User Excellence Awards (for the most recent winners, see the Nov. 25 issue). Another is the International Communications Association's (ICA) Call for Innovation program, which we're proud to cosponsor.

Through the Call for Innovation, ICA and *Network World* honor network pros for their creative application of net technology. And we're accepting entries now for the Sixth Annual

Call for Innovation program.

If your achievements deserve recognition, please submit a 150- to 250-word abstract describing either:

■ An innovative application of network technology to solve a problem or gain a competitive advantage.

■ Work you've undertaken with a vendor to develop a new product or service needed by your company.

■ Actions you've taken that have influenced the standards-setting or regulatory process.

■ Original research you've conducted that resulted in new applications for technology.

Submit your abstract by Dec. 31 to Special Projects Editor, *Network World*, 161 Worcester Road, Framingham, Mass. 01721. Or fax your entry to us at (508) 820-3467. Be sure to include your name, title, company, address and telephone number.

Winners will be honored at the ICA's May 1992 conference in Atlanta.

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| 5. Professional/Service        | 14. Consultant                     |
| 6. Education                   | 15. Software                       |
| 7. Health Care                 | 16. Other (Specify) _____          |
| 8. Government                  |                                    |
| 9. Communication Carriers      |                                    |

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2. Marketing/Sales
3. Production/Operations
4. Telecom Management (Voice/Data)
5. Voice Communications Management Only
6. Data Communications Management Only
7. Network Systems Analyst/Planner
8. EDP System/Program/Planning
9. Office/Automation Systems Management

##### Communications manufacturers/vendors:

10. General Management
11. Marketing/Sales
12. Hardware Manufacturing & Development
13. Software Development
14. Engineering
15. Consultant
16. Other (Specify) \_\_\_\_\_

#### D. Size of Your Organization (Circle One)

1. Under 100   2. 100-499   3. 500-999   4. 1,000-4,999   5. Over 5,000

#### E. What is your role in the purchasing process of communications equipment and services? (Circle One)

1. Final decision maker   2. Recommend   3. Specify   4. No role   NW2



## FDDI EQUIPMENT

# FDDI grasps the backbone

CONTINUED FROM PAGE 1

tors, bridges and routers that provide access to an FDDI backbone.

But while FDDI's role as a backbone seems established, its role as a so-called to-the-desktop LAN is not so certain. In this area, FDDI still faces stiff competition from entrenched and far less expensive Ethernet and token-ring LANs, which can run on unshielded twisted-pair wiring.

Moreover, most personal computers don't need FDDI's

*Terrie is president of Newport Consulting, a Scituate, Mass.-based firm specializing in strategic, competitive and product or technology analysis for local- and wide-area network hardware and software.*

speed. The vast majority of PCs today use the Industry Standard Architecture (ISA) bus, which can only sustain a data transmission rate of less than 1M bit/sec, hardly enough to stress Ethernet and token-ring LANs, much less an FDDI LAN.

### Building blocks

For these reasons, installing FDDI as a to-the-desktop LAN

may be premature for many users. But FDDI products for backbone LANs have been selling well. There are four building blocks for constructing an FDDI network: adapters, concentrators, bridges and routers. The latter three comprise the hub in a hub-and-spokes LAN topology. (Information about these products is listed in the accompanying charts.)

The most basic building block

### CHART • GUIDE

Buyer's Guide charts comparing FDDI bridges, routers and brouters begin on page 28, while charts examining FDDI concentrators and adapters begin on pages 31 and 32, respectively.

of an FDDI network is the adapter, which provides a physical link between a device such as a desktop workstation or a concentrator and the network. Adapters come in two basic flavors: single-attached stations (SAS), which connect to a single port on a concentrator, and dual-attached stations (DAS), which connect to

*(continued on page 33)*

Cheaper options  
are coming for  
FDDI to the desktop.

## FDDI bridges, routers and brouters

Company	Product	Description	Number of ports or slots	Internal bandwidth	Media supported	Throughput	WAN connections	Protocols routed and filtered	Management/diagnostics	Price/warranty	Distribution
Alantec Fremont, Calif. (510) 770-1050	PowerHub Integrated LAN Platform	Integrates concentrator technology with IP routing and bridging	12 ports supporting 36 Ethernet connections; 2 FDDI ports, either SAS or DAS	400M bit/sec	UTP, AUI, BNC, fiber-optic inter-repeater link and FDDI	Filters 89.28K packet/sec; bridge forwards 61.60K packet/sec; routing forwards 50K packet/sec	None	IP routed, all others filtered	SNMP agent MIB I and II/LEDs, software	\$14,880 for 12-port Ethernet configuration; \$37,800 for 12-port configuration with 2 FDDI links/1 year on hardware, 90 days on software	Direct sales
ASCOM Networks San Diego (800) 283-3334	Fibertalk 3000 Channel Bridging Unit	Bridges FDDI to IBM host channel (System/370) intended to provide links between Ethernet workstations bridged to FDDI and IBM	1 System/370 bus and tag port; 1 DAS FDDI port	VMEbus at 4M byte/sec	FDDI	2.8M byte/sec	NA	TCP/IP	Proprietary OS/2-based management and diagnostics	\$25,000/1 year	Direct sales, resellers
	Fibertalk 5000 Transparent Bridge	Bridges Ethernet and token ring to FDDI	4 slots/1 port, each with any combination of Ethernet and token-ring connections	VMEbus at 640M bit/sec	Ethernet and token ring-to-FDDI single- or multimode fiber	Filters 446.43K packet/sec; forwards 22.50K packet/sec for FDDI	None	NA	SNMP, SMT Version 6.2/LCDs, software	\$28,500 to \$40,500 fully loaded/1 year	Direct sales, resellers
BICC Communications Auburn, Mass. (508) 832-8650	ISOLAN FDDI/802.3 Bridge Model 1420-0	2-port FDDI Ethernet bridge	2 ports	100M bit/sec	1 Ethernet and 1 FDDI SAS or DAS port	Filters 460K packet/sec; forwards over 14K packet/sec with average 90-microsec delay	None	Supports STP, filters source and destination addresses, priority for user groups, closed user groups, broadcast and multicast	Common Management Information Protocol, SNMP (MIB II) in first half of 1992/LCD for setup, configuration and viewing parameters; LEDs for diagnostics	\$27,500/1 year	Direct sales and through major distributors
Cisco Systems, Inc. Menlo Park, Calif. (415) 326-1941	AGS +	Multiprotocol, multimedia internetwork bridge/router	9 slots/28 ports maximum	533M bit/sec bus	Up to 4 FDDI (single- or multimode fiber) or 7 4M or 16M bit/sec token-ring connections, or 28 Ethernet connections	Forwards 65K packet/sec; filters 460K packet/sec (per FDDI interface)	Maximum of 28 serial connections at up to DS3/E-3; frame relay support for routing TCP/IP, Digital Equipment Corp. DECnet, Apple Computer, Inc. AppleTalk, SDLC, Novell, Inc. IPX, Xerox Corp. XNS, OSI, Banyan Systems, Inc. VINES and Apollo Division of Hewlett-Packard Co. Domain; local and remote for source routing token rings and STP	16, including DECnet, AppleTalk, SDLC, IPX, XNS, OSI, VINES and Apollo Domain; local and remote for source-routing token rings and STP	SNMP agent management/LEDs, software	From \$14,500, depending on configuration; \$14,000 per FDDI interface; packet switch software for frame relay, SMDS and X.25: \$3,200; bridging software, \$1,800/90 days	Direct sales in North America; OEM through AT&T and DEC; distributors in Europe, Pacific Rim and South America
Digital Equipment Corp. Maynard, Mass. (508) 493-7151	DECbridge 500	Provide interconnection between an FDDI network and 1 or more Ethernet LANs with Request For Comment 791 standard, transparent fragmentation of large FDDI packets	1 FDDI port and 1 Ethernet port	12.5-MHz custom bus	Standard and non-standard multimode as well as single-mode fiber types	Filters 460K packet/sec; forwards 14.88K packet/sec	None	All Ethernet	DEC Remote Bridge Management Software, SNMP agent, SMT Version 6.2/LEDs, software	\$25,000 to \$41,000/1 year on site	Direct sales and through distributors worldwide
	DECbridge 600	Provides interconnection between an FDDI network and 1 or more Ethernet LANs with Request For Comment 791 standard, transparent fragmentation of large FDDI packets	1 FDDI port and up to 3 Ethernet ports	12.5-MHz custom bus	Standard and non-standard multimode as well as single-mode fiber types	Filters 480K packet/sec and forwards 20K packet/sec	None	All Ethernet	DEC Remote Bridge Management Software, SNMP agent, SMT Version 6.2/LEDs, software	\$21,000 to \$45,000 (depending on configuration)/1 year on site	Direct sales and through distributors worldwide
Fibercom, Inc. Roanoke, Va. (703) 340-6700	RingMaster 7200	Multiprot bridge featuring STP and transparent packet fragmentation	5 ports; 1 FDDI and up to 4 Ethernet	540M bit/sec	Up to 4 Ethernet connections and 1 FDDI connection	Filters 500K packet/sec; forwards 20K packet/sec	None	Protocol independent	SNMP agent, with optional SNMP client package for a variety of workstations/LEDs, software	\$8,000 per port/1 year	Direct sales
Fibermux Corp. Chatsworth, Calif. (818) 709-6000	FX5510T	Token ring-to-FDDI source routing bridge	1 token ring; 1 FDDI	100M bit/sec	1 FDDI DAS on multimode fiber; 1 token ring on unshielded twisted pair	Filters 13K packet/sec, forwards 2.8K packet/sec	None	None	SMT/LEDs, software	\$25,000/1 year	Direct sales, resellers
	FX5520EZ	Ethernet-to-FDDI bridge/router	1 or 2 Ethernet; 1 FDDI	100M bit/sec	1 DAS FDDI on multimode up to 2 km, 1 to 2 Ethernet via AUI	Filters 15K packet/sec, forwards 3.60K packet/sec	None	TCP/IP	SMT/LEDs, software	\$22,000 to \$27,000, depending on options/1 year	Direct sales, resellers
Fibronics International, Inc. Hyannis, Mass. (508) 778-0700	FX8210 Token Ring Bridge	Ethernet-to-FDDI bridge supporting STP, transparent packet fragmentation and support for IBM source routing and Microsoft Corp. LAN Manager	1 FDDI port; 1 or 2 token-ring ports; 1 Ethernet port	NA	Token-ring connector; Ethernet AUI or FDDI SAS or DAS on single-mode or multimode fiber	FDDI filtering up to 416.67K packet/sec; Ethernet and token-ring filtering up to full bandwidth with high-performance interface	None	None	Fibronics Network Management System supporting SNMP/Power-on self diagnostics	\$16,990/90-day, extended warranty available	Direct sales, value-added resellers, distributors, OEMs

AUI = Attachment unit interface  
DAS = Dual attached station  
DDS = Digital data service  
IP = Internet Protocol  
IPX = Internetwork Packet Exchange  
ISA = Industry Standard Architecture  
MIB = Management Information Base  
NA = Not applicable

RIP = Routing Information Protocol  
RISC = Reduced Instruction Set Computer  
SAS = Single attached station  
SMDS = Switched Multimegabit Data Service  
SMT = Station Management Protocol  
SNMP = Simple Network Management Protocol  
STP = Spanning Tree Protocol  
UTP = Unshielded twisted pair

This chart includes a representative selection of FDDI bridges, routers and brouters. These vendors may offer other such products, and other vendors not included may offer a full range of comparable products.

SOURCE: NEWPORT CONSULTING SCITUATE, MASS

## FDDI bridges, routers and routers (continued on page 30)

Company	Product	Description	Number of ports or slots	Internal bandwidth	Media supported	Throughput	WAN connections	Protocols routed and filtered	Management/diagnostics	Price/warranty	Distribution
Fibronics (continued)	FX8210 Translation Bridge	Ethernet-to-FDDI bridge supporting STP and transparent packet fragmentation	1 FDDI port; 1 or 2 Ethernet ports	NA	Ethernet AUI or FDDI SAS or DAS on single or multimode fiber	FDDI filtering up to 416.67K packet/sec; Ethernet filtering and forwarding up to full bandwidth with high-performance interface	None	None	Fibronics Network Management System supporting SNMP/Power-on self-diagnostics	\$14,990/90 days, extended warranty available	Direct sales, value-added resellers, distributors, OEMs
	FX8210 Translation Router	Ethernet-to-FDDI bridging or routing via IP or DECnet routing	1 FDDI port; 2 Ethernet ports	NA	Ethernet AUI or FDDI SAS or DAS on single or multimode fiber	FDDI filtering up to 416.67K packet/sec; Ethernet filtering up to full bandwidth/ forwarding 8.50k packet/sec; routing filters 22K packet/sec and forwards 6K packet/sec with high-performance interface	None	None	Fibronics Network Management System supporting SNMP/Power-on self-diagnostics	\$21,990/90 days, extended warranty available	Direct sales, value-added resellers, distributors, OEMs
IBM White Plains, N.Y. (914) 642-3000	IBM 3172 Interconnect Controller Model 2 FDDI Gateway	Provides connectivity between IBM hosts and FDDI, token-ring and Ethernet LANs for SNA or TCP/IP networks	5 slots; 2 channel adapters and 1 FDDI adapter	IBM Micro Channel Architecture	FDDI, token ring and Ethernet	Not specified	None	SNA and TCP/IP	SNMP, IBM NetView/LEDs, software	\$50,000 to \$100,000, depending on configuration; FDDI adapter: \$26,000; token-ring adapter: \$895/1 year	Direct sales, built to order
NCR Corp. Dayton, Ohio (800) 225-5627	NCR StarWAN Router Model 450	High-performance LAN interconnect device for FDDI, Ethernet and token-ring LANs across local and remote links	Numerous configurations support up to 28 Ethernet, 4 DAS FDDI, 7 token ring, 12 RS-232 or 16 V.35/RS-440 interfaces, although not simultaneously	454M bit/sec	Supports a variety of modules mixing Ethernet, token-ring and FDDI SAS and DAS connections	FDDI: filters 500K packet/sec, routing forwards 400K packet/sec; high-speed Ethernet filters 15K packet/sec, routing forwards 12K packet/sec, bridging forwards 10K packet/sec; token-ring filters full speed, forwards 10K packet/sec	Interface module options with data rates ranging from 9.6K bit/sec to 4.096M bit/sec with load sharing; X.25, frame relay and SMDS network services also supported	TCP/IP, ISO Connectionless Network Service, StarGROUP/3000 LAN Manager, DECnet, XNS, Apollo Domain, IPX, VINES, AppleTalk and more; FDDI, Ethernet and serial links may be mixed in an arbitrary topology	SNMP, centralized management via NCR StarSENTRY System Manager/Diagnostics support installation; LEDs on CPU cards and EXEC software commands further aids tracking down problems	\$19,000 to \$75,000, depending on configuration; average list price per port is \$2,171/1 year	Worldwide via AT&T/NCR direct and indirect sales channels
Network Systems Corp. Minneapolis (612) 424-4888	6000 Series RISC Bridge-Router	A high-performance bridge/router	16 slots supporting up to 32 T-1s or Ethernets; 5 FDDI links	800M bit/sec backplane with 1 to 3 RISC processors/interface card	2- or 4-port Ethernet modules; 3-port token-ring modules; up to 5 FDDI modules; 2 to 4 port T-1 modules; up to 5 1-port T-3 modules	14.43K packet/sec for Ethernet; full bandwidth for FDDI	2 to 4 T-1 ports with true load balancing; 1 T-3 port	TCP/IP, DECnet, OSI End System to Intermediate System, dynamic Intermediate System to Intermediate System, IPX/Sequenced Packet Exchange, Appletalk Phase II, XNS	SNMP-MIB II/LEDs, software	\$6,000 to \$31,000, depending on configuration/105 days	Direct sales in U.S., Canada, Europe; distributors elsewhere
Newbridge Networks, Inc. Herndon, Va. (703) 834-3600	Mainstreet 8100 Router/Bridge	Multiprotocol router/bridge for FDDI, Ethernet, token-ring and T-1 networks	13 slots with up to 4 DAS FDDI ports	320M bit/sec VMEbus	FDDI, Ethernet, token ring	20K packet/sec	Variable T-1, E-1, V.35, X.21, RS-232; up to 48 separate ports with load sharing	TCP/IP, DECnet, IPX, XNS, AppleTalk	SNMP/LEDs, software	\$16,000 for base unit; \$20,000 for 2-port FDDI interface, software included/1 year	Direct sales
Proteon, Inc. Westborough, Mass. (508) 898-2800	ProNET CNX 500 Bridging Router	High-performance, RISC-based bridging router designed to meet needs of large networks; uses Advanced Micro Devices, Inc. Am29000 and Intel Corp. i960 bridging accelerator RISC processors; National Semiconductor Corp. chipset	6 LAN and 6 WAN ports	100M bit/sec for FDDI	6 Ethernet, 6 token ring; 3 FDDI; thick and thin coaxial, UTP (Ethernet and token ring only), UTP and fiber	Filters 160K packet/sec; forwards 25K packet/sec with 64-byte packets (smallest size packets)	6 ports	Routes TCP/IP, IPX, DECnet, XNS, AppleTalk, Apollo Domain, OSI	SNMP, SMT, NetView via SNMP traps/Watchdog timer, event logging system	\$10,000 to \$30,000, depending on configuration/3 months	System integrators, value-added resellers and strategic partners
	ProNET p4200 FDDI Router	Provides FDDI connectivity as well as metropolitan-area network capability	9 slots for up to 14 connections	Not specified	Up to 7 Ethernet and 7 token ring; 2 FDDI; thick and thin coaxial, UTP (Ethernet and token ring only), UTP and fiber	Forwards 5K packet/sec	Up to 14 WAN ports via X.25, DDS, or T-1	Routes AppleTalk, Apollo Domain, DECnet, TCP/IP, IPX, OSI, XNS; WANs: X.25, DDS, or T-1	SNMP agent/Watchdog timer, event logging system	\$15,000 to \$30,000, depending on configuration/3 months	System integrators, value-added resellers and strategic partners
Raycom Systems, Inc. Van Nuys, Calif. (818) 909-4186	FDDI Ring 100	Encapsulation or translation Ethernet-to-FDDI bridge designed to work with concentrator	Has 1 Ethernet AUI/10Base-T port and 1 FDDI SAS or DAS port	400M bit/sec	1 Ethernet AUI/10Base-T port and 1 FDDI SAS or DAS port	Filters 14.50K packet/sec for Ethernet and 500K packet/sec for FDDI; forwards 16K packet/sec for Ethernet	None	Filters TCP/IP, AppleTalk, XNS, IPX	SNMP/LEDs, software	\$13,500 to \$22,500/1 year	LAN, data system integrators
	Token Ring to FDDI Bridge	Source routing bridge designed to operate in IBM environment	2 ports	400M bit/sec	4M or 16M bit/sec token-ring and FDDI SAS or DAS	Filters FDDI at 500K packet/sec; filters token ring at 153K packet/sec; forwards at 2K packet/sec	None	Source routing	SNMP/LEDs, software	\$13,500 to \$22,500/1 year	LAN, data system integrators

AUI = Attachment unit interface  
DAS = Dual attached station  
DDS = Digital data service  
IP = Internet Protocol  
IPX = Internetwork Packet Exchange  
ISA = Industry Standard Architecture  
MIB = Management Information Base  
NA = Not applicable

RIP = Routing Information Protocol  
RISC = Reduced Instruction Set Computer  
SAS = Single attached station  
SMDS = Switched Multimegabit Data Service  
SMT = Station Management Protocol  
SNMP = Simple Network Management Protocol  
STP = Spanning Tree Protocol  
UTP = Unshielded twisted pair

This chart includes a representative selection of FDDI bridges, routers and routers. These vendors may offer other such products, and other vendors not included may offer a full range of comparable products.

SOURCE: NEWPORT CONSULTING, SCITUATE, MASS

## FDDI bridges, routers and routers (continued from page 29)

Company	Product	Description	Number of ports or slots	Internal bandwidth	Media supported	Throughput	WAN connections	Protocols routed and filtered	Management/diagnostics	Price/warranty	Distribution
Sumitomo Electric USA, Inc. Santa Clara, Calif. (408) 737-8517	SUMINET-3500 Series Bridge/Router	A modular bridge/router for Ethernet and token ring to FDDI	5 slots; 3 slots/6 Ethernet ports, 1 slot/1 token-ring port, 1 slot/1 FDDI DAS port	32-bit VMEbus	Ethernet AUI, token ring via shielded twisted pair or UTP, FDDI multimode fiber; all standard distances	Bridge filtering: 500K packet/sec for FDDI; forwarding: 14,880 for Ethernet, 3K packet/sec for token ring; routing forwarding: 10K packet/sec for Ethernet; 3K packet/sec for token ring	V.35 (1 link/module)	IP, DECnet	SNMP, SMT Version 6.2, Sumitomo proprietary network management protocol/Not specified	\$26,000 for bridge with 2 Ethernet ports, 1 token-ring port and 1 DAS FDDI port; \$29,000 for router with 2 Ethernet ports, 1 token-ring port and 1 DAS FDDI port/1 year	Direct sales
Synemetics, Inc. North Billerica, Mass. (508) 670-9009	LANplex 5004 and LANplex 5012 hubs	Modular, third-generation hubs targeted at high-performance applications; each Ethernet has full bandwidth	LANplex 5004/5012 have 4/12 slots, respectively, supporting up to 16/80 Ethernet connections or up to 10/42 FDDI ports	Aggregate bandwidth is 800M bit/sec	FDDI Concentrator Module: 4 FDDI ports for multimode SAS connection; FDDI Enterprise Modules: 2 FDDI ports supporting multimode fiber or single mode up to 10 km; Ethernet Express Modules: support 8 10Base-T and 1 FDDI port	Each Ethernet Express module can filter the maximum rate on all 9 interfaces (565.47K packet/sec) and forward 37K packet/sec	None	None	SNMP, SMT/Board and port-level diagnostics, LEDs, on-line diagnostic software standard	Price per port ranges between \$1,700 and \$3,700; Ethernet Express module: \$12,500; FDDI concentrator module: \$8,500/90 days	Direct sales and via value-added resellers and systems integrators
SysKonnnect, Inc. Saratoga, Calif. (408) 725-4666	SK-Router	Comprises the SK-5143 bus mastering adapter, routing software and 1 or more Ethernet/token-ring cards plugged into a PC's ISA bus (works in Novell server)	Supported configurations include FDDI to 4 Ethernet; FDDI to 1 token ring and 3 Ethernet; FDDI to 2 token ring and 1 Ethernet	PC AT (ISA) bus bandwidth; however, the bus mastering throughput for Ethernet is 1.2M bit/sec and 4.50K packet/sec between FDDI and Ethernet for 256K-byte packets	AUI, BNC, 10Base-T for Ethernet; UTP/unshielded twisted pair for token ring; multimode fiber for FDDI	1.5M to 2M bit/sec between FDDI and 2 Ethernet segments	None	IP and IPX simultaneously	SNMP, SMT/Software	Estimated price is \$10,300, including routing software, though product not sold directly to users/1 year	Sold through high-end system integrators, value-added resellers, OEMs
3Com Corp. Santa Clara, Calif. (408) 764-5378	LinkBuilder 3GH	A 12-slot modular concentrator/bridge for Ethernet and FDDI LANs; 1 slot reserved for system management module	12 ports; 8 ports per Ethernet module; 4 ports per FDDI module	3 FDDI buses as well as 3 Ethernet and 3 token-ring buses to be used with future interface modules; 1 VME management bus	Ethernet: 8 segments per module (over 2,500 total), with each segment bridged; 4-port FDDI concentrator modules; FDDI backbone access via 1 DAS connection/module	Filters 565K packet/sec; forwards 407K packet/sec (per fully loaded system)	None	None, protocol-independent	SNMP, SMT/Network management module provides full management and diagnostics of all modules, has 3 out-of-band ports	\$31,525 with 1 Ethernet module; \$159,325 with 11 Ethernet LAN modules and a dual-power supply; management module included/1 year	Multiple channels, both direct and indirect sales
	NETBuilder II	High-performance, modular internet-working bridge/router supporting FDDI, Ethernet and high-speed serial links	Comes in 2-, 4- or 8-slot versions; 1 port per slot	800M bit/sec Ethernet and FDDI	1 Ethernet/10Base-T per module; FDDI 1 port/module (SAS or DAS)	Bridge filtering 450K packet/sec for FDDI; forwarding 50K packet/sec FDDI; router forwarding 25K packet/sec (estimate)	High-speed serial single port/module; lines speeds from 9.6K bit/sec to 9.2M bit/sec with Class of Service load balancing	Routes TCP/IP, XNS, OSI, DECnet Phase IV, AppleTalk Phase II; bridges all other protocols; can filter any type of packet, including via custom-designed filters	SNMP, SMT/Self-test diagnostics and separate diagnostic processor for each module, on-line testing for all modules	Sample configurations: 4 Ethernet ports, \$13,245; 2 Ethernet ports, 1 FDDI port, \$17,995; 6 Ethernet ports, 1 FDDI port, \$21,995/1 year	Multiple channels, both direct and indirect sales
Timeplex, Inc. Woodcliff Lake, N.J. (800) 755-8526	Time/LAN 100 Router* Bridge	Concurrent bridge/router in stand-alone, multislot chassis	3 slots with up to 12 ports	528M bit/sec	Ethernet AUI, 4M or 16M bit/sec token ring, FDDI (SAS or DAS, multimode or single-mode fiber)	14.5K packet/sec Ethernet IP routing or bridging	RS-232, RS-422, V.11, V.35, X.25, Digital Data Network and frame relay, with load balancing for routing/bridging	Network layer: IP, XNS, IPX; routing: Open Shortest Path First, IPX, XNS RIP, IP RIP, Exterior Gateway Protocol	SNMP (MIB II)/SMT supervisory port diagnostics, optional element management, front panel LEDs/LCDs	\$7,995 (2 Ethernet) to \$53,500 (3 FDDI)/1 year	Direct sales
Ungermann-Bass, Inc. Santa Clara, Calif. (408) 496-0111	ASM-5361 FDDI Inter-networking Platform	FDDI Ethernet bridge/router card for Access/One Platform	1 DAS/SAS FDDI port, 1 Ethernet, 1 320M-byte Ungermann-Bass PlusBUS	320M bit/sec	Ethernet multimode (SAS/DAS), up to 2 km on standard multimode fiber or Category 1 single mode (SAS/DAS) up to 10 km	Bridge filters 500K packet/sec and forwards 50K packet/sec; router filters 500K packet/sec and forwards 30K packet/sec	None	IP, XNS, IPX, DecNet, AppleTalk planned	LEDs, SNMP-based network management software/LEDs, software	\$20,990 for SAS, \$22,995 for DAS/1 year	Direct sales and through select resellers
Wellfleet Communications, Inc. Bedford, Mass. (617) 275-2400	Backbone Node	High-end concentrator bridge/router with high-availability fault tolerance	52 ports, up to 13 FDDI connections	1G bit/sec	Ethernet, token ring, FDDI	Filters 480K packet/sec IP routing, higher for bridging	X.25, fractional T-1/E-1, frame relay, SMDS, SDLC, high-speed private line	TCP/IP, DECnet, IPX, XNS, AppleTalk, X.25	SNMP-based management/LEDs, software	Starts at \$6,495, depends on configuration/90 days	Direct sales, value-added resellers, international distributors
	Concentrator Node	High-end concentrator bridge/router	52 ports, up to 13 FDDI connections	320M bit/sec	Ethernet, token ring, FDDI	188K packet/sec	X.25, fractional T-1/E-1, frame relay, SMDS, SDLC, high-speed private line	TCP/IP, DECnet, IPX, XNS, AppleTalk, X.25	SNMP-based management/LEDs, software	\$20,000 to \$68,000, depends on configuration/90 days	Direct sales, value-added resellers, international distributors
	Link Node	Mid-range concentrator bridge/router	Up to 16 Ethernet or token-ring ports or 4 FDDI ports	320M bit/sec	Ethernet, token ring, FDDI	58K packet/sec	X.25, T-1/E-1, frame relay, SMDS, SDLC, high-speed private line	TCP/IP, DECnet, IPX, XNS, AppleTalk, X.25	SNMP-based management/LEDs, software	\$24,500 with 2 Ethernet ports and 1 FDDI port, depends on configuration/90 days	Direct sales, value-added resellers, international distributors

AUI = Attachment unit interface  
DAS = Dual attached station  
DDS = Digital data service  
IP = Internet Protocol  
IPX = Internetwork Packet Exchange  
ISA = Industry Standard Architecture  
MIB = Management Information Base  
NA = Not applicable

RIP = Routing Information Protocol  
RISC = Reduced Instruction Set Computer  
SAS = Single attached station  
SMDS = Switched Multimegabit Data Service  
SMT = Station Management Protocol  
SNMP = Simple Network Management Protocol  
STP = Spanning Tree Protocol  
UTP = Unshielded twisted pair

This chart includes a representative selection of FDDI bridges, routers and routers. These vendors may offer other such products, and other vendors not included may offer a full range of comparable products.

SOURCE: NEWPORT CONSULTING, SCITUATE, MASS.

## NETWORK WORLD

## FDDI concentrators

Company	Product	Description	Number of ports or slots	Internal bandwidth	Media supported	Management/diagnostics	Price/warranty	Distribution
Crescendo Communications, Inc. Sunnyvale, Calif. (408) 732-4400	Crescendo 1000 Workgroup Concentrator	FDDI concentrator supporting shielded twisted-pair or UTP wiring using proprietary encoding scheme	10 ports, no slots	100M bit/sec	Shielded twisted pair up to 100 meters or UTP up to 50 meters	SMT, SNMP/Self-diagnostics, LEDs, software	\$7,995 for standard 8 CDDI on UTP; \$8,990 with 2 A/B CDDI UTP ports; \$10,990 with 2 A/B FDDI ports/1 year	Direct sales, value-added resellers
Digital Equipment Corp. Maynard, Mass. (508) 486-5096	DECconcentrator 500	A modular FDDI concentrator configurable for different topologies, such as a dual ring of trees; supports dual homing for fault-tolerant configuration	3 slots for 4- or 6-port modules, for a maximum of 18 ports; a network management module provides management and dual-ring connection	100M bit/sec	Management modules support multimode fiber (up to 2 km) or single-mode fiber (up to 40 km) for the A and B ports; 4-port modules support single-mode or multimode fiber; 6-port modules support multimode, low-power optics (up to 1 km) or shielded twisted pair up to 100 meters	DEC Remote Bridge Management System, SNMP agent, SMT Version 2/LEDs, software	Ranges from \$6,000 to \$52,500, depending on configuration; per-port prices range from \$667 for shielded twisted pair to \$1,875 for dual-ring ANSI optics/1 year on site	Direct sales and through distributors and OEMs worldwide
Interphase Corp. Dallas (214) 919-9000	FiberHUB Concentrator	FDDI concentrator	Up to 16 ports; 2 per slot	100M bit/sec	Multimode or shielded twisted pair	SNMP agent/LEDs	\$14,000 for 8 ports with multimode fiber; up to \$21,000 fully loaded/1 year	OEM and systems integrators
NCR Corp. Dayton, Ohio (800) 225-5627	NCR StarLAN 100 Network Concentrator	Modular FDDI concentrator	Base unit includes FDDI and Access/Extension units, supporting a DAC configuration and 2 SAS stations or 1 DAS station; up to 3 4-port FDDI extension units are supported	100M bit/sec	Standard multimode fiber; AT&T Systemax Premises Distribution System-compatible	SNMP support is planned; will enable centralized management via NCR StarSENTRY Systems Manager/LEDs, software	Ranges from \$6,000 for the base unit to \$40,000 fully loaded with 14 FDDI SAS ports (\$2,500 per port)/1 year	Worldwide via AT&T/NCR direct and indirect sales channels
Network Peripherals, Inc. Milpitas, Calif. (408) 321-7300	NP-MC Modular Workgroup Concentrator	Modular concentrator supporting fiber and shielded twisted-pair connections	8 slots for up to 16 ports maximum in 2-port increments	100M bit/sec	Multimode fiber and shielded twisted pair	SNMP optional, SMT standard/LEDs, out-of-band serial port diagnostic monitoring	NP-MC/D DAC: \$9,995 with 4 shielded twisted-pair ports, \$11,995 with 4 fiber ports; 2-port shielded twisted-pair module: \$1,995; 2-port fiber module: \$2,995/1 year	Direct sales, OEMs, value-added resellers
Optical Data Systems, Inc. Richardson, Texas (214) 234-6400	ODS 1092	FDDI concentrator	2 slots/up to 12 ports	Not specified	FDDI multimode and single mode fiber; shielded twisted pair	SMT, SNMP/LEDs, in-band and out-of-band diagnostics	Chassis and power supply: \$4,470; 6-port modules range from \$5,640 to \$16,990, depending on media/1 year	Direct sales
	ODS 1090	High-end FDDI concentrator	10 slots/up to 60 ports	Not specified	FDDI multimode and single-mode fiber; shielded twisted pair	SMT, SNMP/LEDs, in-band and out-of-band diagnostics	Chassis and power supply: \$10,240; 6-port modules range from \$5,640 to \$16,990, depending on media/1 year	Direct sales
Sumitomo Electric, USA, Inc. Santa Clara, Calif. (408) 737-8517	SUMINET-3500 Concentrator	FDDI concentrator	6 slots/12 ports including DAS backbone connection and 10 ports	VMEbus	Multimode fiber	SNMP, SMT Version 6.2, Sumitomo proprietary network management protocol/Not specified	\$20,000 with DAS backbone connection and 10 SAS ports; 1 year	Direct sales
Summit Microsystems Corp. Sunnyvale, Calif. (408) 730-4900	smFD-AT301 Design Kit using AMD Supernet II chipset	A reference/learning aid for FDDI users and product developers	4, 8 or 12 ports	Cards install in AT Industry Standard Architecture bus	Multimode fiber up to 2 km	SMT Version 6.2/Status LEDs	\$5,490/1 year	Direct sales
SynOptics Communications, Inc. Santa Clara, Calif. (408) 988-2400	Model 2914 FDDI Fiber Workgroup Concentrator	A preconfigured concentrator with 14 FDDI ports, including backbone connections	14 ports	2-MAC/3-Path FDDI architecture provides 200M bit/sec bandwidth	Multimode fiber	SNMP, SMT Version 6.2/Extensive diagnostics	\$23,995 for 2914; \$3,995 for Local Network Management for Unix/1 year	Direct sales and through value-added resellers worldwide
	Model 2912 FDDI STP Workgroup Concentrator	A preconfigured concentrator with 14 FDDI shielded twisted-pair ports, including backbone connections	14 ports	2-MAC/3-Path FDDI architecture provides 200M bit/sec bandwidth	Shielded twisted pair	SNMP, SMT Version 6.2/Extensive diagnostics	\$15,500 for 2914; \$3,995 for Local Network Management for Unix/1 year	Direct sales and through value-added resellers worldwide
	System 3000 Intelligent Concentrator	A high-end, high-performance concentrator for FDDI, Ethernet and token-ring LAN connections; features 3-MAC/3-Path FDDI architecture, graceful insertion, dual homing	10 slots/up to 42 FDDI connections, including backbone connections	300M bit/sec (3 FDDI paths)	Multimode fiber and shielded twisted pair	SNMP, SMT Version 6.2/Extensive diagnostics	FDDI Network Management Module: \$14,995; 4-port fiber host module: \$7,495; 4-port shielded twisted-pair host module: \$4,995; FDDI-Ethernet-Token Ring Concentrator: \$4,495/1 year	Direct sales and value-added resellers worldwide
Timeplex, Inc. Woodcliff, N.J. (800) 755-8526	Time/LAN 100 FDDI Concentrator*32	Concentrator for up to 32 SAS FDDI connections featuring dual homing, hot swap and gentle insertion	32 ports for SAS connections plus 1 DAS port; optional redundant power supply and CPU	FDDI	Single- or dual-mode fiber at up to 2 km or 40 km	SNMP agent for local or remote monitoring, Management Information Base II support, FDDI SMT, optional element management/LEDs, software	\$24,000 to \$73,000, depending on configuration; \$1,950 for optical bypass for DAS (optional)/1 year	Direct sales
Ungermann-Bass, Inc. Santa Clara, Calif. (408) 496-0111	ASM-1000 FDDI Concentrator Module	1- to 3-card Access/One module, configurable as 4-, 10- or 16-port concentrator for SAS or DAS	1 to 3 slots; 4, 10, or 16 ports	100M bit/sec	Multimode fiber	SMT, SNMP/LEDs, software	\$3,000 per port for 16 ports/1 year	Direct and limited sales channels

CDDI = Copper Distributed Data Interface  
 DAC = Dual-attachment concentrator  
 DAS = Dual attached station  
 MAC = Media access control

SAS = Single-attached station  
 SMT = Station Management Protocol  
 SNMP = Simple Network Management Protocol  
 UTP = Unshielded twisted pair

This chart includes a representative selection of FDDI concentrators. These vendors may offer other such products, and other vendors not included may offer a full range of comparable products.

SOURCE: NEWPORT CONSULTING, SCITUATE, MASS.

## NETWORK WORLD

## FDDI adapters

Company	Product	System and bus	Architecture	Installation features	Drivers supplied	Media supported	Management/diagnostics	Price/warranty	Distribution
ASCOM Networks San Diego (800) 283-3334	Fibertalk Channel Extension Unit	IBM or plug-compatible host bus and tag interface	Multiple Motorola, Inc. 68020 processors	Via local or remote downline loading	For IBM host operating systems such as VM/370, MVS, MVS/Extended System Architecture and SNA	FDDI DAS multimode fiber	Proprietary OS/2-based management/LEDs, software	\$35,000/1 year	Direct sales and resellers
Crescendo Communications, Inc. Sunnyvale, Calif. (408) 732-4400	Crescendo CDDI SBus Adapter	For Sun Microsystems, Inc. SPARCstations	256K-byte RAM packet buffer, Motorola 68030 processor, AMD FDDI chipset, DMA and bus mastering host access	Automatic	Yes, not specified	Uses proprietary Physical Medium Dependent chip, STP up to 100 meters, unshielded twisted pair up to 50 meters	SMT, SNMP/LEDs, software	\$1,495/1 year	Direct sales and VARs
Digital Equipment Corp. Maynard, Mass. (508) 486-5096	FDDIcontroller 400	XMI bus for DEC VAX 6000 and 9000 systems	1M-byte RAM packet buffer, 16-MHz 68020-16 processor, DEC chipset design licensed to AMD and Motorola, DMA and programmed I/O host access	Automatic	VMS V5.4-3 for DECnet Phase IV and Local Area Transport	Multimode fiber up to 2 km	SMT Version 6.2, SNMP agent, DECnet management/LEDs, software	\$19,900 to \$24,900/1 year	Direct sales, distributors and OEMs worldwide
	FDDIcontroller 700 and 700-C	DEC TURBOchannel bus-based RISC systems	1M-byte RAM packet buffer, 16-MHz 68020-16 processor, DEC chipset design licensed to AMD and Motorola, DMA and programmed I/O host access	Automatic	Ultrix Version 4.2	Multimode, 150-ohm type 1, 2, or 6 STP, or 50-ohm thin coaxial cable	SMT Version 6.2, SNMP agent, DECnet management/LEDs, software	FDDIcontroller 700, \$6,000; FDDIcontroller 700-C, \$4,500/1 year	Direct sales, distributors and OEMs worldwide
Hewlett-Packard Co. Palo Alto, Calif. (800) 752-0900	HP FDDI/9000 for Series 700	EISA bus	128K-byte RAM packet buffer with on-board processor, AMD and Motorola chipsets, DMA and bus mastering host access	Automatic	Yes, not specified	Multimode fiber	SMT 6.2, SNMP-Management Information Base II/LEDs, software	\$5,995/90 days	HP sales force
Interphase Corp. Dallas (214) 919-9000	M/FDDI Multibus I Controller	Multibus I systems	1M-byte RAM packet buffer, AMD Am29000 processor and FDDI chipset, programmed I/O, DMA or bus mastering host access	Manual settings	Unix, VxWorks	Multimode fiber up to 2 km	SMT/LEDs, software	\$8,795 for SAS, \$10,995 for DAS/1 year	Direct sales, OEMs and VARs
	V/FDDI 4211 Peregrine	VMEbus systems	1M-byte RAM packet buffer, AMD Am29000 processor and FDDI chipset, programmed I/O, DMA, or bus mastering host access	Manual settings	Unix, VxWorks	Multimode fiber up to 2 km	SMT/LEDs, software	\$8,775 for SAS, \$10,995 for DAS/1 year	Direct sales, OEMs and VARs
Microdyne Corp. EXOS Division Alexandria, Va. (703) 739-0500	EXOS 505F	IBM PC AT/ISA bus	128K-byte RAM packet buffer, AMD Supernet II chipset	Jumper-selectable interrupts	LAN Workplace for DOS Version 4.0 (TCP/IP) and Novell, Inc. NetWare IPX	Multimode fiber up to 2 km	Not specified	\$2,395/not specified	Direct sales and distributors such as Horizon Technology, Inc.
	EXOS 505S	IBM PC AT/ISA bus	128K-byte RAM packet buffer, AMD Supernet II chipset	Jumper-selectable interrupts	LAN Workplace for DOS Version 4.0 (TCP/IP) and NetWare IPX	IBM Type 1 STP up to 100 meters	Not specified	\$1,495/not specified	Direct sales and distributors such as Horizon Technology
Network Peripherals, Inc. Milpitas, Calif. (408) 321-7300	NP-AT/D Dual Attach FDDI Adapter	IBM PC AT/ISA bus	128K-byte RAM packet buffer, National Semiconductor Corp. chipset, data handling via hardware gate array for high performance, programmed I/O host access	Automatic via supplied utility	NDIS for DOS, NDIS for OS/2, NetWare 386 Server/ODI, PC-NFS	Standard multimode up to 2 km or STP up to 100 meters	SMT/LEDs with diagnostic utility	\$5,495/1 year	International distributors, OEMs (Cabletron Systems, Inc., Optical Data Systems, Inc., Ungermann-Bass, Inc.) and VARs
	NP-AT/S Single Attach FDDI Adapter	IBM PC AT/ISA bus	128K-byte RAM packet buffer, National Semiconductor chipset, data handling via hardware gate array for high performance, programmed I/O host access	Automatic via supplied utility	NDIS for DOS, NDIS for OS/2, NetWare 386 Server/ODI, PC-NFS	Standard multimode up to 2 km or STP up to 100 meters	SMT/LEDs with diagnostic utility	\$3,495 for fiber, \$2,995 for STP/1 year	International distributors, OEMs (Cabletron, Optical Data Systems, Ungermann-Bass) and VARs
	NP-EISA	EISA bus	128K-byte RAM packet buffer, National Semiconductor chipset, data handling via hardware gate array for high performance, bus mastering with 33M bit/sec burst mode transfers	Automatic via supplied utility	NDIS for DOS, NDIS for OS/2, NetWare 386 Server/ODI, PC-NFS	Standard multimode up to 2 km or STP up to 100 meters	SMT/LEDs with diagnostic utility	\$3,995 for fiber, \$3,495 for STP/1 year	International distributors, OEMs (Cabletron, Optical Data Systems, Ungermann-Bass) and VARs
	NP-EISA/D	EISA bus	128K-byte RAM packet buffer, National Semiconductor chipset, data handling via hardware gate array for high performance, bus mastering with 33M bit/sec burst mode transfers	Automatic via supplied utility	NDIS for DOS, NDIS for OS/2, NetWare 386 Server/ODI, PC-NFS	Standard multimode up to 2 km or STP up to 100 meters	SMT/LEDs with diagnostic utility	\$5,995/1 year	International distributors, OEMs (Cabletron, Optical Data Systems, Ungermann-Bass) and VARs
	NP-SB/S	SBus for Sun SPARCstation 1, 1+, 2, IPC, IPX and SPARCserver 600 MP	128K-byte RAM packet buffer, National Semiconductor chipset, data handling via hardware gate array for high performance, bus mastering host access	Automatic via supplied utility	Sun SunOS 4.1.1	Standard multimode up to 2 km or STP up to 100 meters	SMT/LEDs with diagnostic utility	\$2,495 for fiber, \$1,995 for STP/1 year	International distributors, OEMs (Cabletron, Optical Data Systems, Ungermann-Bass) and VARs
	NP-VME/D	VME bus	128K-byte RAM packet buffer, National Semiconductor chipset, data handling via hardware gate array for high performance, bus mastering host access	Automatic via supplied utility	SunOS 4.1.1	Standard multimode up to 2 km or STP up to 100 meters	SMT/LEDs with diagnostic utility	\$4,495/1 year	International distributors, OEMs (Cabletron, Optical Data Systems, Ungermann-Bass) and VARs
	NP-VME/S	VMEbus	128K-byte RAM packet buffer, National Semiconductor chipset, data handling via hardware gate array for high performance, bus mastering host access	Automatic via supplied utility	SunOS 4.1.1	Standard multimode up to 2 km or STP up to 100 meters	SMT/LEDs with diagnostic utility	\$3,295 for fiber, \$2,795 for STP/1 year	International distributors, OEMs (Cabletron, Optical Data Systems, Ungermann-Bass) and VARs

AMD = Advanced Micro Devices, Inc.

DAS = Dual Attached Station

DMA = Direct Memory Access

EISA = Extended Industry Standard Architecture

IPX = Internetwork Packet Exchange

NDIS = Network Device Interface Specification

NFS = Network File Service

ODI = Open Data-Link Interface

RISC = Reduced Instruction Set Computer

SAS = Single Attached Station

SK-UPPS = SysConnect's Universal Portable Protocol Stack

SMT = Station Management Protocol

SNMP = Simple Network Management Protocol

STP = Shielded twisted pair

VAR = Value-added reseller

This chart includes a representative selection of FDDI adapters. These vendors may offer other such products, and other vendors not included may offer a full range of comparable products.

SOURCE: NEWPORT CONSULTING, SCITUATE, MASS

## FDDI adapters

Company	Product	System and bus	Architecture	Installation features	Drivers supplied	Media supported	Management/diagnostics	Price/warranty	Distribution
Network Systems Corp. Minneapolis (612) 424-1555	Data Exchange Host Controller Adapter	IBM, Federal Information Processing Standard and Cray Research, Inc. compatible hosts	1M- to 16M-byte RAM packet buffer, AMD Am29000 and Motorola 68020 and 68030 on-board processors, AMD and National Semiconductor chipsets, shared memory and DMA host access	Not specified	Supplied by computer vendor	Ethernet up to 1,600 meters, FDDI multimode up to 2 km, T-1 and T-3 unlimited, parallel DMA up to 100 feet	SNMP/LEDs, software	\$33,500 to \$65,500/105 days	Direct sales
Rockwell CMC Santa Barbara, Calif. (800) 262-8023	CMC-1150 Series	VMEbus	2M-byte RAM packet buffer with 25-Mhz AMD Am29000 RISC processor, AMD, AT&T and Rockwell CMC custom silicon, DMA host access	Manual settings	SunOS Version 4.1 or later, Unix System 5 Release 3, Software Components Group pSOS+, Wind River Systems, Inc. VxWorks	Standard multimode fiber up to 2 km	SMT, SNMP/LEDs, software	\$8,995 for SAS or \$9,750 for DAS, software included/1 year	Direct sales, international distributors, OEMs, resellers and systems integrators
SBE, Inc. Concord, Calif. (510) 680-7722	VCOM-100 FDDI Adapter Card for VMEbus Systems	VMEbus systems	4M-byte RAM packet buffer, 25-MHz 68030 processor, National Semiconductor chipset, shared memory and bus mastering host access	Programmable interrupts	Unix System V, SunOS	FDDI multimode	SNMP/LEDs, software	\$4,500 for 100/1 year	Direct sales
Silicon Graphics, Inc. Mountain View, Calif. (415) 962-3529	FDDIXPress Adapter Board	VMEbus	1M-byte RAM packet buffer, AMD FDDI chipset and 29000 RISC processor, shared memory, programmed I/O, DMA or bus mastering host access	Automatic	Yes, for all Silicon Graphics workstations and servers	Standard FDDI multimode fiber up to 2 km	SMT 6.2, SNMP/soft-ware	\$9,500/90 days	Direct sales and distributors
Sumitomo Electric USA, Inc. Santa Clara, Calif. (408) 737-8517	SUMINET-3500 Network Service Board	IBM Micro Channel Architecture (for IBM RS/6000)	256K-byte RAM packet buffer, Motorola 68000 processor, AMD FDDI chipset, shared memory and bus mastering	Automatic installation for Sun workstations	Yes, for Sun and IBM RS/6000 workstations	Fiber	SMT Version 6.2, Sumitomo's proprietary network management protocol/LEDs, self test	\$5,000 for SAS connection/1 year	Direct sales
	SUMINET-3500 Network Service Board	VMEbus	256K-byte RAM packet buffer, 68000 processor, Sumitomo chipset, shared memory and bus mastering	Automatic installation for Sun workstations	Yes, for Sun and IBM RS/6000 workstations	Fiber	SMT Version 6.2, Sumitomo's proprietary network management protocol/LEDs, self test	\$12,000 for DAS, \$5,000 for SAS/1 year	Direct sales
Summit Microsystems Corp. Sunnyvale, Calif. (408) 730-4900	smFD-AT210 Reference Card/Design Kit (for users and product developers)	IBM PC AT/ISA bus	128K-byte RAM packet buffer, AMD Supernet II chipset, DMA host access	Manual configuration for interrupts	None	Standard multimode fiber up to 2 km	SMT Version 6.2/not specified	\$5,490/1 year	Direct sales
SysKonnnect, Inc. Saratoga, Calif. (408) 725-4666	SK-5141	IBM PC AT/ISA bus	128K-byte static CMOS RAM packet buffer, AMD Supernet II chipset, DMA engine, AMD Formac Plus LAN Controller, programmed I/O or DMA host access	Switch-selectable interrupts	SK-UPPS driver software, which provides access to Novell ODI, Microsoft Corp. NDIS, DECnet, Sun PC-NFS; FTP Software, Inc. drivers for The Santa Cruz Operation, Inc. SCO Unix and Interactive Systems Corp. Interactive Unix Operating System	Standard multimode fiber	SMT 6.1, SNMP/soft-ware	About \$4,200 (not sold direct to users)/1 year	High-end system integrators, OEMs and VARs
	SK-5142	IBM PC AT/ISA bus	128K-byte static CMOS packet buffer, AMD Supernet II chipset, DMA engine, AMD Formac Plus LAN Controller, PLC1, programmed I/O or DMA host access	Switch-selectable interrupts	SK-UPPS driver software, which provides access to Novell ODI, Microsoft NDIS, DECnet, Sun PC-NFS; FTP Software drivers for SCO Unix, Interactive Systems Unix also supported	Standard multimode fiber	SMT 6.1, SNMP/soft-ware	About \$6,500 (not sold direct to users)/1 year	High-end system integrators, OEMs and VARs
	SK-5143	IBM PC AT/ISA bus	128K-byte static CMOS packet buffer, AMD Supernet I chipset, DMA engine, AMD Am29000 RISC processor, programmed I/O, DMA or bus mastering host access	Switch-selectable interrupts	SK-UPPS driver software, which provides access to Novell ODI, Microsoft NDIS, DECnet, Sun PC-NFS; FTP Software drivers for SCO Unix, Interactive Systems Unix also supported	Standard multimode fiber	SMT 6.1, SNMP for the client, and any others residing on top of ODI/IPX, IP, NDIS or connectionless network service/software	About \$7,500 (not sold direct to users)/1 year	High-end system integrators, OEMs and VARs
	SK-5151	IBM PC AT/ISA bus	128K-byte static CMOS packet buffer, AMD Supernet II chipset, DMA engine, AMD FORMAC Plus as LAN controller, programmed I/O or DMA host access	Switch-selectable interrupts	SK-UPPS driver software, which provides access to Novell ODI, Microsoft NDIS, DECnet, Sun PC-NFS; FTP Software drivers for SCO Unix, Interactive Systems Unix also supported	Standard multimode fiber	SMT 6.1, SNMP/soft-ware	About \$3,700 (not sold direct to users)/1 year	High-end system integrators, OEMs and VARs
	SK-5152	IBM PC AT/ISA bus	128K-byte static CMOS packet buffer, AMD Supernet II chipset, DMA engine, AMD FORMAC Plus as LAN controller, programmed I/O or DMA host access	Switch-selectable interrupts	SK-UPPS driver software, which provides access to Novell ODI, Microsoft NDIS, DECnet, Sun PC-NFS; FTP Software drivers for SCO Unix, Interactive Systems Unix also supported	Standard multimode fiber	SMT 6.1, SNMP/soft-ware	About \$3,700 (not sold direct to users)/1 year	High-end system integrators, OEMs and VARs

AMD = Advanced Micro Devices, Inc.  
 DAS = Dual Attached Station  
 DMA = Direct Memory Access  
 EISA = Extended Industry Standard Architecture  
 IPX = Internetwork Packet Exchange  
 NDIS = Network Device Interface Specification  
 NFS = Network File Service  
 ODI = Open Data-Link Interface

RISC = Reduced Instruction Set Computer  
 SAS = Single Attached Station  
 SK-UPPS = SysKonnnect's Universal Portable Protocol Stack  
 SMT = Station Management Protocol  
 SNMP = Simple Network Management Protocol  
 STP = Shielded twisted pair  
 VAR = Value-added reseller

This chart includes a representative selection of FDDI adapters. These vendors may offer other such products, and other vendors not included may offer a full range of comparable products.

SOURCE: NEWPORT CONSULTING, SCITUATE, MASS

(continued from page 27)

two ports on one or more concentrators or directly to two counter-rotating FDDI rings (see "FDDI configuration options," page 36).

Currently, FDDI adapters are

much more expensive than Ethernet adapters, with the lowest priced adapters for FDDI SAS connections costing from \$2,500 to \$3,500, while the most inexpensive Ethernet adapters cost from \$100 to \$200. Moreover,

contrary to expectations, FDDI adapter prices have not dropped much during the year.

For example, adapters from Digital Equipment Corp., Network Peripherals, Inc. and Rockwell CMC listed in an earlier FDDI

Buyer's Guide ("FDDI products proliferate, prices plummet," NW, Feb. 11), have not changed in price at all. Networks Peripherals's NP-AT/S SAS adapter still costs \$3,495, while DEC's FDDI-controller 700 remains priced at

\$6,000.

One thing has changed: With the advent of reliable FDDI concentrators, a good 80% of all FDDI adapters sold are now of the SAS variety, instead of the more

(continued on page 34)

(continued from page 33)  
expensive DAS variety.

However, recent competition to sell FDDI chipsets is likely to push the prices of FDDI products down in 1992. Advanced Micro Devices, Inc. (AMD), Motorola, Inc. and National Semiconductor Corp. are all shipping FDDI chipsets, setting the stage for significant price drops.

In addition to a strong move toward SAS adapter and concentrator-based topologies, lower cost media options are emerging that will speed price declines for FDDI adapters and FDDI LANs in general.

For example, some vendors are offering a proprietary scheme that requires less expensive optics on adapter boards. FDDI can stretch to 2 km between nodes using standard 11-decibel (db) optics and multi-mode fiber, enabling FDDI stations to be spread across a campus environment without requiring repeaters or bridges. However, DEC offers a version of one of its workstation adapters, the FDDIcontroller 700, that uses less expensive 8-db optics supporting distances as far as 1 km, more than enough to reach any desktop.

**R**ecent competition to sell FDDI chipsets is likely to push FDDI prices down.



This low-power optics option will likely be widely offered because DEC is highly influential and has been a key FDDI technology developer (both AMD and Motorola license DEC's FDDI chipset design). Also putting pressure on optical adapter board vendors is an increase in the number of adapters that enable FDDI to run over copper wire, such as shielded and unshielded twisted pair.

For example, some SAS adapters that enable FDDI to run over shielded twisted pair, such as DEC's FDDIcontroller 700-C, cost \$500 to \$2,000 less than their fiber-based SAS cousins. FDDI concentrators that can support shielded twisted-pair connections, such as SynOptics Communications, Inc.'s Model 2914 FDDI shielded twisted-pair Workgroup Concentrator, offer users a similar cost savings over fiber-based SAS concentrators.

Existing products that transmit the FDDI standard over shielded or unshielded twisted pair are based on proprietary technologies. However, there are moves afoot to standardize FDDI over copper. These planned standards are now being called the Copper Distributed Data Interface, or CDDI (see "The copper connection to FDDI," page 36).

A CDDI standard will force producers of transceivers for accessing fiber to drop costs to compete with transceivers for accessing copper wire; this is likely to result in fiber transceiver costs being marginally more expensive than copper transceivers in three to five years. And with more users pulling fiber as a hedge against the future, fiber's reliability and longevity may dampen demand for FDDI over unshielded twisted pair by mid-decade.

For the next six to 12 months, the FDDI over shielded twisted-pair option offered for most of the adapters listed in the chart

provides some cost reduction, especially for users who already have shielded twisted pair installed.

In selecting FDDI adapters, users should bear in mind that if they seek high throughput on their FDDI backbones, the most useful adapters are likely to be the fastest — but they also may be the most expensive. FDDI adapters are more expensive than Ethernet or token-ring adapters because they have 32-bit on-board processors and enough random-access memory to process FDDI packets quickly.

FDDI adapters require considerable RAM. Most of the adapters in the chart have 128K-byte RAM packet buffers, with a few, such as DEC's FDDIcontroller 700, coming with 1M byte of RAM for packet buffering.

Manufacturers offer FDDI adapters for ISA, Extended ISA (EISA), and Micro Channel Architecture buses. Ten of the 28 adapters in the charts are for the ISA bus, and only three are for the EISA bus. Of the rest, most are for the VMEbus often found on workstations and for Sun Microsystems, Inc. SPARCstations.

Where PCs are concerned, there is a dual role envisioned. PCs may be connected to Novell, Inc. NetWare, Microsoft Corp. LAN Manager, or a Unix network in an engineering environment. The drivers supplied reflect these dual roles, as a number of vendors with PC adapters offer Novell Open Data-Link Interface or Internetwork Packet Exchange (IPX) and Microsoft Network Device Interface Specification. Net-

work Peripherals, Microdyne Corp. and SysKonnex, Inc. all provide PC LAN drivers for their PC adapters. Users looking to give a performance boost to a big PC LAN can use these adapters to put a server on an FDDI backbone.

Concentrators, bridges, routers and routing bridges (also known as brouters) all serve as hubs in the hub-and-spoke LAN topology. Some hubs can provide combinations of these functions — for example, 3Com Corp.'s LinkBuilder 3GH performs concentration and bridging, while Wellfleet Communications, Inc.'s Backbone Node provides concentration, bridging and routing.

The key differences to be aware of in hub design are modularity and internal

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bandwidth. Single-function hubs, such as concentrators, lend themselves well to the fixed "pizza box" configuration, which is a low-profile, slotless and usually rack-mountable enclosure. This is especially true for low-end products supporting no more than a dozen or so ports but is also true to some degree for larger port configurations, as modularity adds both flexibility and cost. SynOptics' Model 2912 and 2914 Workgroup Concentrators are prime examples of this optionless pizza box configuration.

Multifunction hubs that offer a mix of concentration, bridging and routing on LAN and wide-area network links obviously need to be modular. Typically, this means multiple internal buses and several

hundred megabits per second of aggregate internal bandwidth. Some products enable the entire backplane to be swapped out.

The following is a breakdown of the types of hubs available and what to look for in each type.

■ **FDDI concentrators.** A key distinction to look for in a concentrator is whether it has a single or dual media access control (MAC) element. For example, SynOptics' Model 2914 has two MAC elements. The first is for sending data, while the other enables a device to be "gracefully," or non-disruptively, inserted into the FDDI ring when it is hooked up to a port and generates a topology map on a network management station to pinpoint any problems at the port level.

A future implementation will enable software-based switching of ports between these MACs to enable data to be sent over both MACs when graceful insertion or management is not being performed. This will effectively double the bandwidth available to the attached stations.

Although the high number of possible configurations make price comparisons difficult, typical concentrator prices range from \$1,500 to \$2,000 per port for FDDI and from \$1,000 to \$1,500 for CDDI, mostly on shielded twisted pair.

■ **Bridges, routers and brouters.** Hubs for bridging multiple LANs are a step up the ladder and are almost by definition modular.

At the low end are multiport bridges,

some offering only a single Ethernet or token-ring port and a single DAS FDDI attachment in a fixed configuration, with prices starting at \$15,000. Typically, these products offer a number of slots for 10Base-T and IEEE 802.5 token-ring port modules, which are bridged to an FDDI backbone via a single DAS attachment. BICC Communications' ISOLAN FDDI/802.3 Bridge and FiberCom, Inc.'s RingMaster 7200 are examples of low-end products that provide only bridging for a few ports.

Higher function products support modules for concentration of Ethernet and token ring, as well as FDDI or CDDI. In addition, they may offer modules for bridging between some or all of the LANs supported, as well as routing for one or more protocols, such as the Transmission Control Protocol/Internet Protocol or IPX.

Essentially, these products — such as Cisco Systems, Inc.'s AGS+, Wellfleet Communications, Inc.'s Backbone Node and Proteon, Inc.'s ProNET CNX — are chameleons, providing functions based on the modules plugged into them. The only difference between many vendor's multiport bridges and brouters is in the modules plugged into them and the software options selected. These products have modules for concentrating 10Base-T, token-ring and FDDI ports, bridging between these LANs, network management, WAN connections and software options for routing a variety of protocols.

Key features to look for are packet translation vs. encapsulation, full-bandwidth filtering and forwarding for bridged packets, automatic fragmentation of large packets being forwarded from FDDI to Ethernet or token-ring LANs, graceful insertion, hot swap and the same network management capabilities, such as port-level trouble shooting, as in a concentrator.

Packet translation is really a must because without it, Ethernet or token-ring packets cannot be received by any of the stations on the FDDI ring. This translation requires not only converting a packet into a different packet format, but fragmenting it as well if the data originated at an FDDI station, such as a server, and is destined for an Ethernet node that supports smaller maximum packet sizes. A few older products used encapsulation methods that wrapped one type of packet into an FDDI packet to simply provide higher shared bandwidth Ethernet or token-ring subnets. Only a few, such as the Raycom Systems, Inc.'s FDDI Ring 100 bridge, still offer this option.

Graceful insertion and hot swap are both features that make managing a network easier. Hot-swap capability enables users to insert, remove or replace a module or port without disturbing the rest of the network. Graceful insertion enables devices to be plugged into the ports provided without disturbing the network. The ability of a hub-based FDDI topology to provide these features is a key reason that only the backbone itself is normally a dual ring and why only hubs should be directly connected to these dual rings.

As for port-level management, being able to view a topology map of the network showing the logical position, type and status of the attached devices is as important for an FDDI LAN as it is for any other. For very large networks, it is important to not only view the status of the network, but also to remotely do something about any undesired conditions, such as removing

(continued on page 36)

# first open system more to the table.



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(continued from page 35)  
malfunctioning nodes.

Where packet filtering is concerned, users should check to see what parameters can be set to customize packet filtering. The most sophisticated bridges, such as 3Com Corp.'s NETBuilder II, can be set to filter on virtually every aspect of a packet, from source and destination addresses to the protocol being used.

## An important factor to consider when selecting an FDDI router or bridge is its forwarding rate.



Brouter capability is offered far less widely, as expertise in protocol routing comes harder than it does for bridging. Cisco, Proteon and Wellfleet were early entrants into this market, but they have been joined by NCR Corp., Newbridge Networks, Inc. and other competitors.

Another important factor to consider when selecting an FDDI router or bridge is its forwarding rate. FDDI bridges and routers often forward packets between FDDI segments or between FDDI and WAN links of comparable speed.

Many of the routers in the charts can forward bridged or routed packets at full bandwidth for Ethernet or token-ring LANs. However, all of the products list-

ed have forwarding rates that would create a bottleneck if two or more FDDI LANs had to be connected and FDDI's full 100M bit/sec bandwidth had to be maintained.

Full bandwidth filtering of FDDI packets flying at 100M bit/sec requires an FDDI filtering rate of 565,469 packet/sec. Moreover, these packets must be fragmented and translated if they are crossing over to an Ethernet port.

To achieve full-speed FDDI packet bridge filtering, many vendors, such as Synernetics, Inc. with its LANplex 5004 and 5012, have opted for a Reduced Instruction Set Computer chip such as AMD's Am29000 on each module to scale filtering/forwarding capacity with the configuration at hand.

Filtering and forwarding for routing is even more demanding. And when FDDI LANs are connected over high-speed WAN links, the rate at which routed packets can be forwarded will be an important issue.

The bottom line for users is to pay close attention to vendor's performance claims for current products and what, if any, upgrades to this performance will be forthcoming to enable effective use of higher speed WAN links. The bridge, router and brouter Buyer's Guide chart lists filtering and forwarding rates under the throughput heading.

### FDDI LAN management

Users must also pay close attention to how an FDDI network will be managed. There are two protocols for managing FDDI LANs: the Station Management Protocol (SMT) and the Simple Network Management Protocol (SNMP). Both are universally

supported by the FDDI hub products in the charts, with SMT software being a prerequisite for all FDDI adapters because it provides parameters used for Physical Connection Management diagnostics as well as an Echo Frame facility for loop-back testing.

One key limitation of SMT is

concentrator or to two different ports on different concentrators. One connection is primary; the other is a backup.

The latter approach, connecting a DAS to two different concentrators, enables even better reliability and redundancy than a direct DAS attachment because the two concentrators can provide entirely separate paths for mission-critical applications.

Another variation of this theme is to use a hierarchical tree topology of concentrators in which the top-level concentrators have DAC connections to the dual-ring FDDI net and the lower level concentrators use DAC connections of two different concentrators on the level above. SAS connections for workstations or servers are made to the lower level concentrators.

— David Terrie

## The copper connection to FDDI

A major factor in determining the cost-effectiveness of running FDDI to the desktop is the emerging Copper Distributed Data Interface (CDDI) media option, which will be a standard way for running Fiber Distributed Data Interface on shielded twisted-pair wire and as yet undetermined grades of unshielded twisted pair. If radiation emission levels can be kept within the Federal Communications Commission's specified limits, CDDI will play a major role in making FDDI cost-effective for a wider portion of the local-area network market.

A chief issue to be addressed at a CDDI special interest group meeting this month is whether there will be separate standards for FDDI over shielded and unshielded twisted pair and which grades of unshielded twisted-pair wire will be included.

Some observers have suggested there will be a single standard for shielded twisted pair and Category 5 unshielded twisted pair, which is a new, heavier gauge wire than the Category 3 unshielded twisted pair currently being installed for 10Base-T or token-ring LANs. But the planned standard

doesn't address users' desires to run FDDI over installed voice- or data-grade unshielded twisted pair.

The emerging CDDI standard would support distances from the wiring closet to the desktop up to the building wiring standard of 100 meters for shielded and unshielded twisted pair.

Moreover, no change to the existing FDDI encoding scheme would be required. In fact, a green book, which contains details of a prestandard implementation of FDDI over shielded twisted pair, is available from Advanced Micro Devices, Inc. (AMD) and Motorola, Inc. It is based on specifications agreed on by AMD, Digital Equipment Corp. and SynOptics Communications, Inc.

Another standard for running FDDI over other grades of unshielded twisted pair, possibly including voice-grade unshielded twisted pair, may also emerge but for shorter distances.

One vendor, Crescendo Communications, Inc., already offers the CDDI SBus Adapter, a CDDI adapter with a modified encoding scheme employed in a proprietary physical media depen-

dent (PMD)-layer chip, which replaces the standard FDDI PMD chip.

Other vendors are also examining alternative encoding schemes, and — as was the case when the 10Base-T standard was being hammered out — multiple proposals will be offered for consideration by the CDDI special interest group. As a result, this FDDI-over-unshielded twisted-pair standard will likely take a year or more to solidify, but when the new encoding scheme is chosen, implementation is likely to be rapid.

Users, having been through the hype for 10Base-T and token ring over unshielded twisted pair, will rightly be skeptical because the same wiring and environmental factors that give 10Base-T problems — such as fluorescent lights and elevators — will prevent the use of CDDI over some installed wire.

Still, it's likely that users will have a standard way to support FDDI over unshielded twisted pair, and that's a potential boon. Nearly all the FDDI adapters listed in the chart starting on page 32 already offer proprietary shielded twisted-pair options.

— David Terrie

## FDDI configuration options

There are two types of nodes defined in the ANSI X3T9.5 Fiber Distributed Data Interface specification: an end station, such as a workstation or server; and a concentrator, or any hub supporting end stations or other local-area networks.

These types of nodes are further distinguished by whether they are connected to single or dual FDDI rings. In a single-ring FDDI network, only one fiber ring is used to transmit data, while a dual-ring FDDI net uses one fiber ring as a primary transmission path and the other as a backup.

Concentrator nodes are called single-attachment concentrators when attached to a single FDDI ring and dual-attachment concentrators (DAC) when attached to two FDDI rings. End stations are single-attached stations (SAS) or dual-attached stations (DAS).

When DAC or DAS connections are made in a dual-ring configuration, they are connected through what are called A and B ports. The A port is connected to the incoming active ring and the outgoing backup ring, and the B port is connected to the incoming backup ring and the outgoing active ring.

DAC- or DAS-connected devices can thus send or receive packets on the backup ring if the primary ring fails between the sending node and the destination node. Both DAS and DAC connections provide a degree of fault tolerance for FDDI LANs, but they are not the only way of achieving this extra degree of reliability.

Fault tolerance may also be provided using a strategy called dual homing.

In dual homing, a DAS or DAC connection is made either to two different ports on a single

that it is not compatible with SNMP.

SynOptics has handled this problem by developing an SMT/SNMP proxy for all its FDDI products, enabling management of the FDDI network from any network running IP protocols. Without this kind of proxy facility, the FDDI and Ethernet or token-ring portions of the network will not be manageable in a unified manner, something that is unacceptable to many users.

FDDI vendors are also debating whether to make a performance tuning option called Parameter Management Frame mandatory. It would add considerable functionality but move SMT even farther away from the lean and mean approach that has made SNMP so popular.

However this issue gets resolved, users should be sure their vendor's SMT is the latest release and has been thoroughly tested at a venue such as the Advanced Network Testing Center, a widely supported testing group sponsored by AMD.

SNMP, initially intended for use in managing TCP/IP networks, has become the hands-down de facto standard for multi-vendor network management, and, as such, is almost universally offered by the vendors in this Buyer's Guide.

### Future outlook

Though it is tempting to envision a world in which FDDI be-

comes the de facto choice for to-the-desktop LAN connections, it is likely to be at least five years before FDDI/CDDI outsells Ethernet and token ring.

**S**SNMP has become the hands-down de facto standard for multivendor network management.



This is because predictions have yet to be realized that desktop devices will demand high bandwidth.

Where FDDI will dominate is in the backbone network. Sales of FDDI bridges and routers probably will increase by 40% to 50% per year, as rapidly increasing LAN sizes and traffic loads demand greatly increased use of bridging/routing and much more backbone bandwidth.

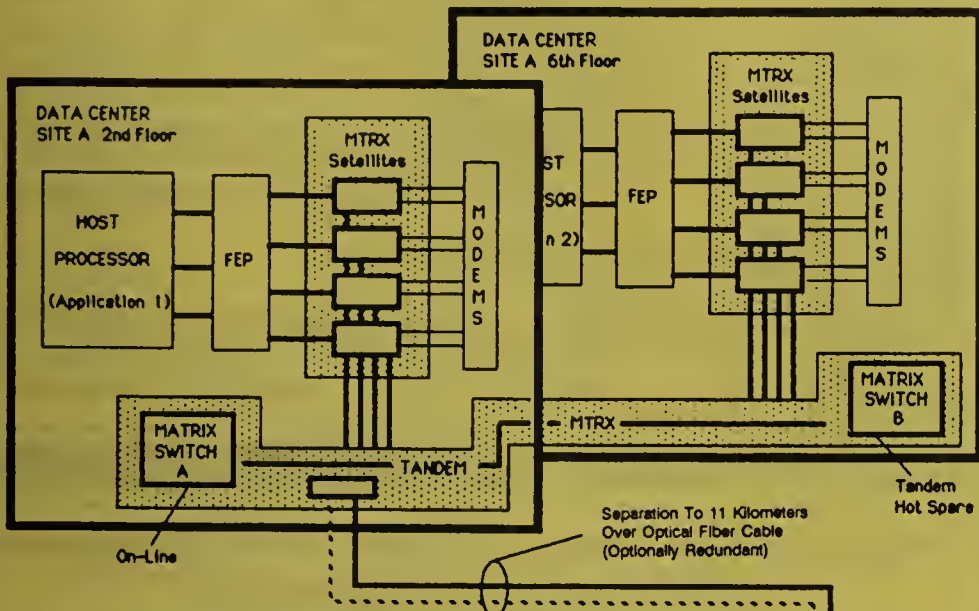
The coming of CDDI offers additional good news, as does the likelihood of strong competition in the market. If caution is exercised, FDDI will provide all the bandwidth most users will need for the next five to 10 years. □

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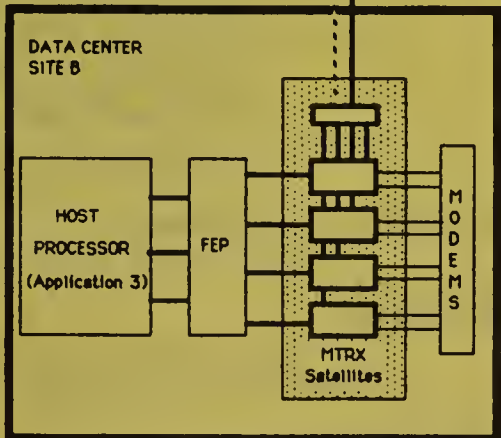


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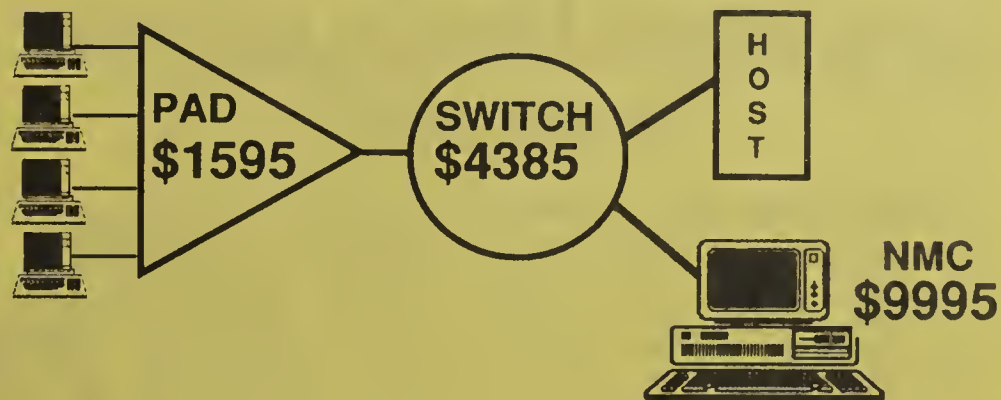
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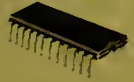
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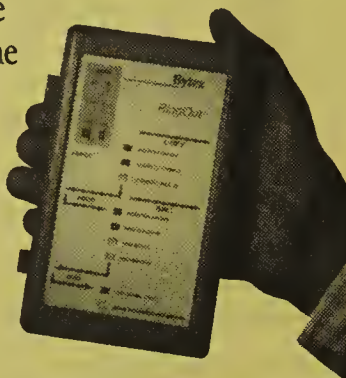
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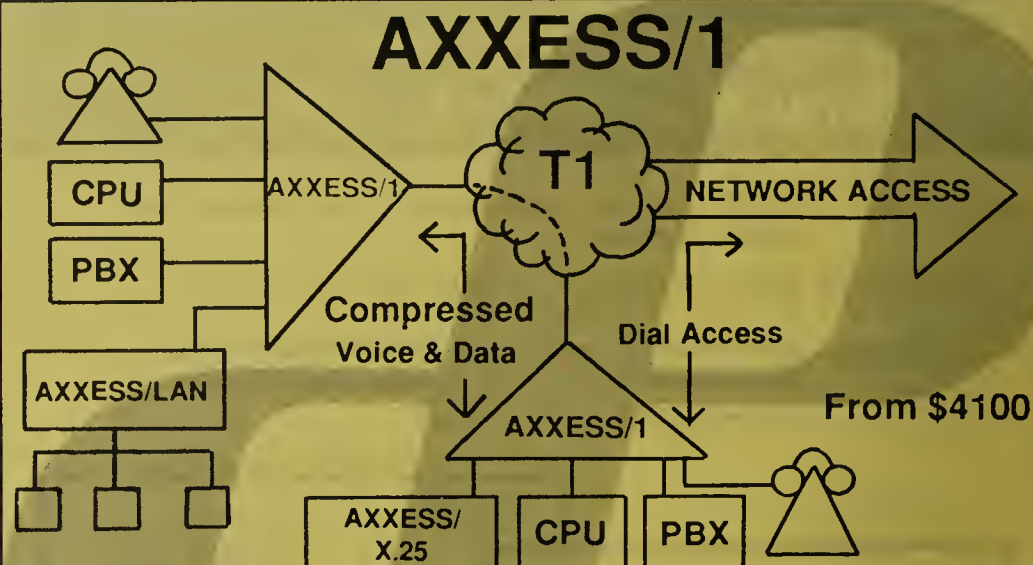


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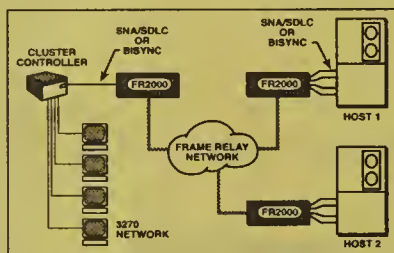
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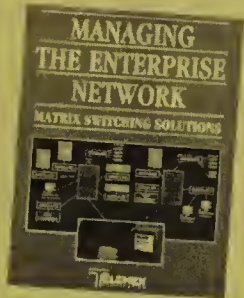
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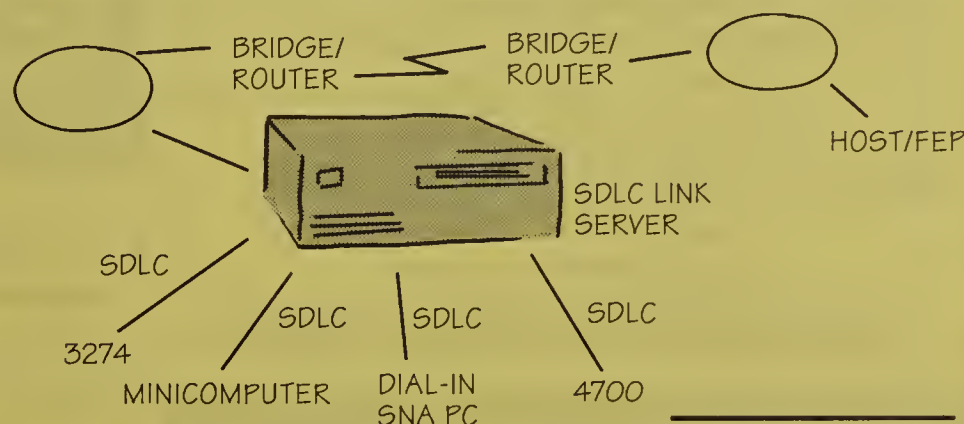


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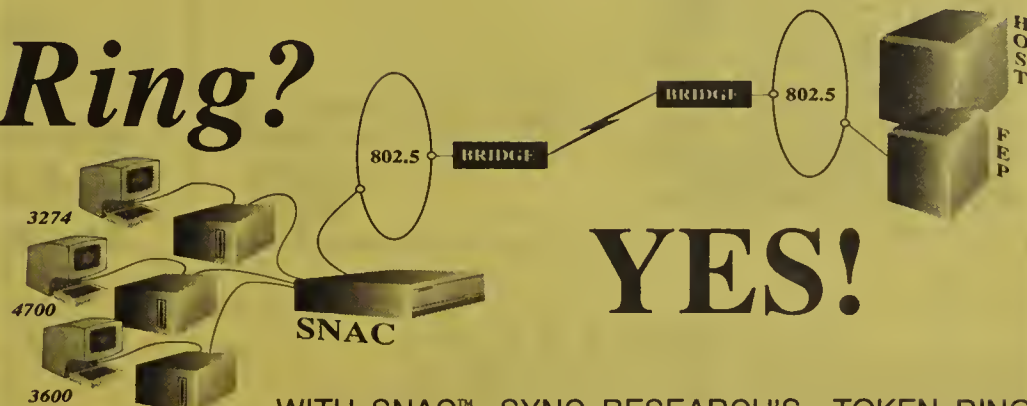


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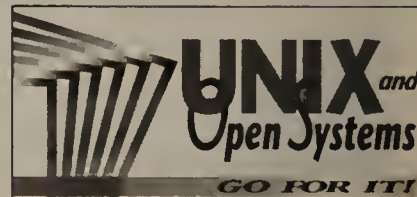
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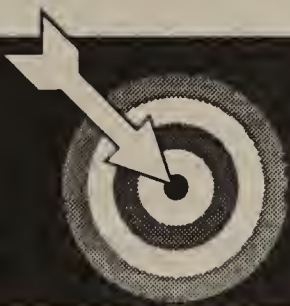
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## AT&T EasyLink rolls out telex

*continued from page 21*

transfers using a method called a test-key procedure. The test key is a table of numerical values corresponding to items that typically appear in a telex message, such as dollar amounts and days of the week and month.

Banks draw up a unique test-key table once a year that they exchange and keep under tight security. The banks use the tables to generate a test-key code for every telex message.

In the manual method of generating test-key codes, a clerical worker adds up the numerical values for each test-key item in an outgoing message to formulate a code. Another worker types the message into the telex machine,

adding in the code.

At the receiving bank, a clerical worker recalculates the test-key values contained in the telex message. If the total value matches the code on the letter, the telex is authentic.

Many banks already use the Telextester PC software. However, this software runs on a stand-alone personal computer and a clerk generally must rekey the telex into Telextester.

The OfficeAccess Bank Test-key software provides an application interface between the Telextester software and OfficeAccess for AS/400 software, which provides AS/400 users with access to the EasyLink net.

After an employee generates a telex message on the AS/400, the OfficeAccess Bank Test-key software then passes it to the PC run-

ning the Leeson Howe software, which generates the test-key code. The OfficeAccess Bank Test-key software then retrieves the telex message and hands it over to the OfficeAccess for AS/400, which sends the message across the net.

The cost of the OfficeAccess Bank Test-key package, which includes OfficeAccess for the AS/400 and the Telextester PC software, is \$20,000. AT&T EasyLink will discount that amount based on the volume of messages a company sends across EasyLink.

Companies can receive the OfficeAccess Bank Test-key Solution free if they commit to spending \$14,000 a month on messaging across the EasyLink network.

For more information, call (800) 242-6005, Dept. 490. **■**

## Notes upgrade boosts support

*continued from page 2*

area network protocols, which provide for tighter coupling of Notes and VINES and better Notes performance in a VINES environment. "By supporting Banyan's wide-area capabilities, Notes gets a free ride across the net," said Eric Sall, director of Notes product management at Lotus.

Lotus has also developed an interface that allows automatic synchronization of StreetTalk, Banyan's distributed naming service, with the Notes Name & Address Book, permitting users to see a uniform global directory. Notes and Banyan Mail users will be able to exchange messages with one another transparently.

Intel Corp., a large user of Notes and VINES, greeted the enhancements enthusiastically. "This is fantastic. For Lotus, this is a step in the right direction," said Ron Rawson, manager of distributed applications at Intel.

Another enhancement to Notes 2.1 is in the area of Notes mail. Lotus has improved the integration of its software products by making it possible to send Notes mail from cc:Mail, 1-2-3, Freelance Graphics and the Ami Pro word processor.

Notes also now supports Microsoft Corp.'s Dynamic Data Exchange specification, which enables users to send Notes mail from other Windows-based applications.

In the future, Notes mail will support the Lotus-sponsored Open Messaging Interface (OMI). As a result, Notes mail will be available across multiple computing platforms, including Apple Computer, Inc. Macintosh and IBM systems. Apple and IBM have pledged to support OMI.

Lotus also last week announced that Compaq Computer Corp. has purchased an additional 2,000 licenses for Notes, bringing the number of licenses at Compaq to more than 2,800.

One Notes' application that

Compaq has created is TechPak, an on-line source of technical information about Compaq products and integration with third-party network and multiuser operating systems. TechPak is used by Accredited Systems Engineers at Authorized Compaq Dealer locations in the U.S.

In other Notes-related developments, Cognos, Inc. has become an Alliance Partner for Notes and will offer Notes integration with upcoming versions of PowerPlay, its desktop executive information system.

Cognos plans to merge PowerPlay's desktop-based business graph and data manipulation capabilities with the conferencing functions of Notes to enable users to share the information needed for effective decision making.

Notes 2.1 is available now. Current users covered by Lotus' maintenance plan will receive a free upgrade to Notes 2.1. Pricing and availability of the Banyan's StreetTalk interface will be announced at a future date. **■**

## Promptus set to unwrap new line

*continued from page 2*

The device includes an integrated channel service unit (CSU) so users do not need a separate CSU to tie video coder/decoders or other devices to the network.

The OASIS 200 features dual data ports on the customer side to support multiple applications such as videoconferencing and local-area network interconnection. The ports have selectable V.35, RS-449 and RS-530 interfaces. The mux also features a second T-1 or E-1 access port that allows voice traffic to be routed over unused bandwidth on the access line.

The OASIS 1000 Bandwidth Manager provides the same features as the OASIS 200 but in a rack-mounted, modular configuration. As many as 12 OASIS 200-

like modules, each supporting two data ports, can be mounted into the chassis.

The OASIS 1000 is suited for multisite videoconference applications, company officials said. A user could, for example, have video codecs coupled with OASIS 200s at remote sites feeding into an OASIS 1000 with a videoconferencing bridge.

The OASIS line features many of the same features of Promptus' CommServer network access devices but boasts a new hardware architecture that will enable the company to price the products aggressively.

"We've kept the software the same to provide backwards compatibility, but the hardware architecture is all new," said Al Lucci, Promptus' president and chief executive officer.

The OASIS 200 is a single-board product and features a keypad for controls, whereas the

CommServer products consist of multiple boards and have a terminal keyboard. The OASIS 1000's bus speed is twice that of the CommServer products, which will continue to be sold, said Jim Dolce, vice-president of engineering at Promptus.

"We're focusing squarely on the inverse mux capabilities," Dolce said. "By doing away with features nonessential to inverse muxing, we've come up with a cost-competitive product line. Other vendors aren't as focused."

The OASIS products will compete with inverse multiplexers from Ascend Communications, Inc., Newbridge Networks, Inc. and others. They will be available in the first quarter of 1992.

The base price for the OASIS 200 will be \$5,000, while the OASIS 1000 will be priced between \$5,100 and \$6,300. A fully configured OASIS 1000 will be about \$20,000. **■**

## Banyan shifts gears in race

*continued from page 9*

slipping further behind market leader Novell.

"Banyan had the best networking technology throughout the '80s, but Novell led the market," said George Colony, president of Cambridge, Mass.-based Forrester Research, Inc. "Banyan just hasn't been able to move fast enough."

Mahoney maintains, however, that the company is moving quickly, especially in lining up vendor alliances. He said that 1991 has been a significant year for Banyan because of the groundwork it laid to strike alliances that will allow it to focus on network services in the future.

These alliances include an agreement with The Santa Cruz Operation, Inc. to off-load Banyan's in-house Unix development and an agreement with Digital Communications Associates, Inc. that enabled Banyan to scale back

its host connectivity software efforts.

The partnerships have freed up vital and costly development resources that are being redeployed on network services development, which is now the core of the company's strategy.

Banyan has already said it will continue to seek agreements with other vendors for technologies that do not directly fit into its network services focus. As an example, the company will continue to support its electronic mail engine but will let other vendors develop user-friendly front ends for it.

Banyan also expects to gain visibility and recognition for its participation in providing a network event logger utility to the Open Software Foundation, Inc.'s (OSF) Distributed Management Environment.

Mahoney said he believes Banyan's eight years of experience in building a distributed network architecture will pay off in its work with OSF through increased visibility in the market. **■**

## WilTel set to revise service

*continued from page 1*

WilPak is priced at a flat rate based on the access port speed and the total committed information rate (CIR) out of each node. The CIR is the minimum guaranteed bandwidth for a frame relay permanent virtual circuit.

While the carrier would not divulge specific frame relay pricing, it detailed three sample net configurations that showed price reductions of 23% to nearly 33% for a five-node mesh network.

For example, the monthly fee for a five-node mesh net with sites in Atlanta, Chicago, Dallas, New York and San Francisco, all using 256K bit/sec access and a CIR of 256K bit/sec from each site to the other four, was \$1,176.50 per node. Under the new price structure, the pricing would be \$905.40 per node, a 23% reduction. The net would cost \$4,527 a month, compared to \$5,882.50 under the older pricing.

Sprint Data Group charges \$4,950 for the same configuration under its usage-based Standard Rate and \$5,600 under its flat Reserved Rate. With Standard Rate, users receive no guarantee that bandwidth will be available when they need it, while Reserved Rate guarantees availability of bandwidth.

When each site uses 1.024M bit/sec access, the net costs \$1,802.20 per node per month, compared to \$2,390 per node, a 24.6% cut. The total would be \$9,011, compared with \$11,950.

Sprint Data Group charges \$10,700 for the same configuration under Standard Rate and \$11,350 under Reserved Rate.

When each site uses a 1.024M bit/sec access port and a CIR of

1.024M bit/sec, the net costs \$3,070.80 per node per month, compared to \$4,556 per node, a 32.6% reduction. The total would be \$15,354 compared with \$22,780.

Sprint Data Group charges \$10,700 (Standard Rate) or \$17,950 (Reserved Rate).

"We thought WilTel's frame relay service was a great value at its original price," said Coyne Gibson, MIS and computer operations manager for CONVEX Computer Corp. in Dallas. "Any reductions are icing on the cake for the installed customer base."

In addition to price reductions, which take effect next week, WilTel is also expanding the range of access speeds it supports. WilPak originally supported 56K, 64K, 256K and 1.024M bit/sec port speeds, but the carrier this week will begin offering 384K, 512K and 768K bit/sec access and has announced it will support 1.544M and 2.048M bit/sec access when StrataCom, Inc. enhances its IPX multiplexers in January.

WilTel is also offering term contracts and volume discounts for WilPak. Users can sign up for one- to five-year contracts rather than buying service on a monthly basis. Sprint Data Group offers one-, two- and three-year contracts. WilTel declined to specify what the volume discounts are.

In addition, WilTel will launch a trial program that lets potential customers use WilPak for one month free of charge.

WilTel will also package the service with routers, data service units/channel service units and other devices, the spokesman said. Users will be able to buy or lease the equipment. **■**

*Senior Editor Paul Desmond contributed to this story.*

## Mux to support frame relay

*continued from page 4*

It is currently in beta test at Telecom Finland and is expected to be generally available in January.

StrataCom tests show that the interface can sustain the transmission of frame relay data at 2.048M bit/sec using frames as small as 80 bytes. "At T-1, we can sustain even smaller frame sizes," Button said.

The cost of the combination board and firmware upgrade, which is accomplished by downloading software, will be \$14,000. Users with IPX software licenses can purchase the board by itself for \$5,000 and get the firmware upgrade for free, Button said.

### Canada goes frame relay

Andrew May, director of network services marketing at CompuServe, said his company will add support for T-1 access sometime after it takes delivery of the card in the first quarter next year.

WilTel plans to announce next week support for T-1 access ports as part of a spate of enhancements and price cuts for its WilPak service.

National Telecom plans to offer access speeds ranging from

56K bit/sec to T-1 when it rolls out its FrameWork frame relay service in Canada in the first quarter of 1992, according to Kevin Hayden, vice-president of digital services for the company.

Initially, the service will be available in Montreal, Ottawa, Toronto and Vancouver, with London coming on-line shortly afterward, Hayden said. By early 1993, the carrier expects to have 13 IPX nodes installed with service available throughout most of Canada.

Today, some Canadian provinces are served by government-owned carriers that are protected from reseller competition. However, National Telecom expects it will be allowed to offer frame relay in these provinces because the government carriers do not offer frame relay service.

The company will offer committed information rates (CIR) ranging from 9.6K to 512K bit/sec. Users will be able to send bursts of traffic above their CIR, which is the amount of bandwidth guaranteed to a user between any two points, up to their access port speed if bandwidth is available on the network.

Pricing for FrameWork has not been determined, although Hayden said the company will attempt to make it comparable to that of U.S. providers. ☐

## IBM boosts TCP/IP for VM

*continued from page 4*

the SNMP agent will actually reside on the mainframe but act on behalf of the 3172.

Users will be able to query the agent from a Unix-based SNMP management system or from IBM's host-based NetView. The agent will mainly support monitoring functions; it does not support the SNMP SET function, which is required to control devices, Minahan said.

To address client/server requirements, IBM is providing a new component dubbed Network Data Base Client/Server System, in TCP/IP for VM.

The component includes client software for RS/6000 and Sun workstations that structures SQL queries and uses a remote procedure call to send the request to server software running on the VM mainframe. The server code communicates with SQL/DS to fulfill the request and returns the data to the client, where it can be used by an application running on the workstation, Holland said.

Dick Boyle, program director at Gartner Group, Inc., a consultancy in Stamford, Conn., said, "I would expect to see MVS picking up the same support since TCP/IP for MVS [announced]

usually follow VM by about three months." Another new feature with Release 2 of the TCP/IP for VM software takes advantage of the new Network Control Program Version 6, due out next September, which gives the 3745 front-end processor support for connectionless SNA routing.

The feature, dubbed SNalink LU 0 Single Session Support, lets IP traffic be routed to a mainframe from a local or remote 3745 via a single full-duplex LU 0 session. Previously, it took two LU 0 sessions to establish a two-way IP session.

"This is more efficient on resources and should be more efficient from a performance point of view," Holland said.

The feature can be employed to let a TCP application supported on a 3745-attached LAN communicate across an SNA backbone with the mainframe via a full-duplex session. Today, only token-ring LANs are supported by the 3745, but IBM is scheduled to ship a 3745 Ethernet LAN adapter in September 1992.

Basic onetime charges for users that buy the new TCP/IP for VM software this month range from \$15,200 to \$43,390. Basic monthly license fees range from \$317 to \$904. All fees will increase about 5% on Jan. 1. ☐

## Vision gains momentum

*continued from page 1*

Open Systems Foundation, Inc. (OSF) Motif graphical user interface that lets users open windows into more than 50 vendor-specific SNMP implementations, obviating the need for multiple management systems.

SynOptics is just the latest in a growing list of vendors to announce technology agreements to furnish Lexcel with its private MIB extensions. Once integrated into Lance+, users will be able to monitor a SynOptics' intelligent hub as if they were using SynOptics' own SNMP-based management product.

"Users are trying to get a grip on how to control and manage the LAN environment, and Lexcel offers a nice, simple and solid solution for managing the LAN internet through SNMP," said Todd Dagres, director of data communications research and consulting at The Yankee Group, a Boston-based consultancy.

Lance+ currently supports any MIB that conforms to ANS.1, including MIB I and II. It also supports the extended MIBs of about 50 vendors, including Cabletron Systems, Inc., Cisco Systems, Inc., David Systems, Inc. and Optical Data Systems, Inc. MIBs define objects that can be managed using SNMP.

Additionally, Lexcel, a wholly owned subsidiary of Micro Technology, Inc., is nearing an infor-

mation resource sharing agreement with Wellfleet Communications, Inc. for the bridge/router vendor's private MIB. The deal is expected to be completed by the end of the year, according to Marc Franz, Lexcel's vice-president of sales and marketing.

### Open platforms

Lance+ is one of many platforms gaining popularity because they enable vendors to address customer demand for integrated LAN management tools while limiting development costs. It is less expensive to develop management products for a few platforms than adapting them to work with every vendor's offerings.

Other platforms include Hewlett-Packard Co.'s OpenView and SunNet Manager, a product offered by Sun's SunConnect business unit.

Unlike OpenView and SunNet Manager, however, Lance+ simply provides for the support of extended MIBs from multiple vendors, enabling users to monitor devices through GET commands and issue SET commands to establish parameters on remote devices.

The SunNet Manager and OpenView platforms are both designed to support vendor-created network management applications under uniform application program interfaces (API). This provides multiple benefits, including the ability to integrate various applications using com-

mon platform services and support for generic third-party network management applications through a published API.

Although Lexcel's product makes it possible to support a range of vendor-specific MIBs on the same station, it does not fully integrate the individual management offerings. However, it can use an SNMP trap editor module to accept an SNMP trap from a SynOptics hub, for instance, and then initiate a SET command to any other device on the network based on the trap information.

In addition, Lexcel does not currently provide a common API that third-party vendors can use to develop generic network management applications for Lance+, although it plans to add an API for its database in a future release.

While Lexcel's sole focus is to provide open systems management for the LAN internetwork, the company said it is working to develop interfaces for enterprise-wide net management systems.

Last summer, Lexcel and AT&T entered into an agreement to develop interfaces from their element management systems that work with the AT&T Accumaster Integrator.

Lexcel said future releases will also provide interfaces to IBM's host-based NetView net management system, OSF's Distributed Management Environment and Digital Equipment Corp.'s Enterprise Management Architecture. ☐

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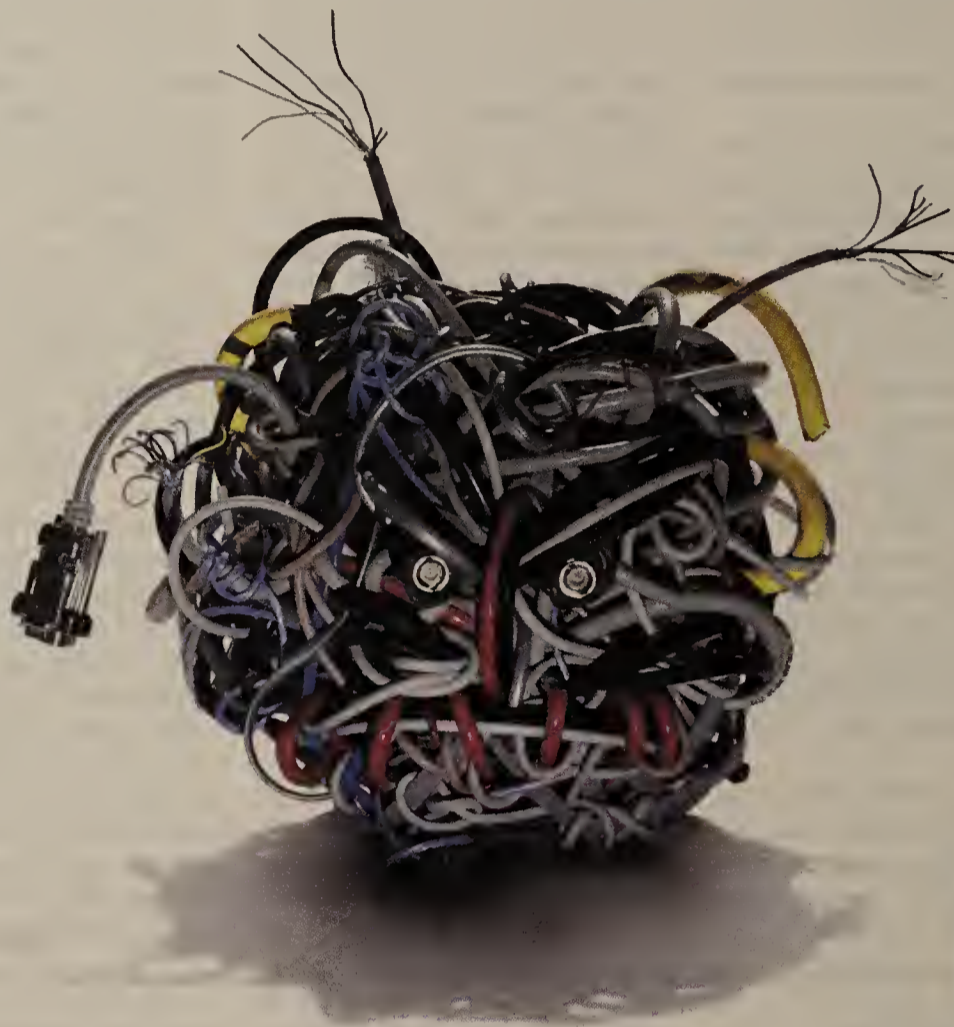
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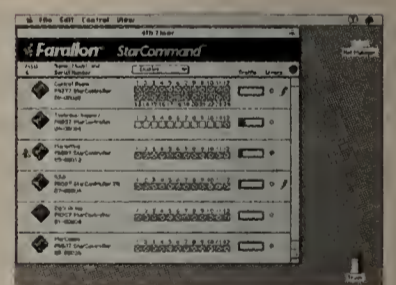
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